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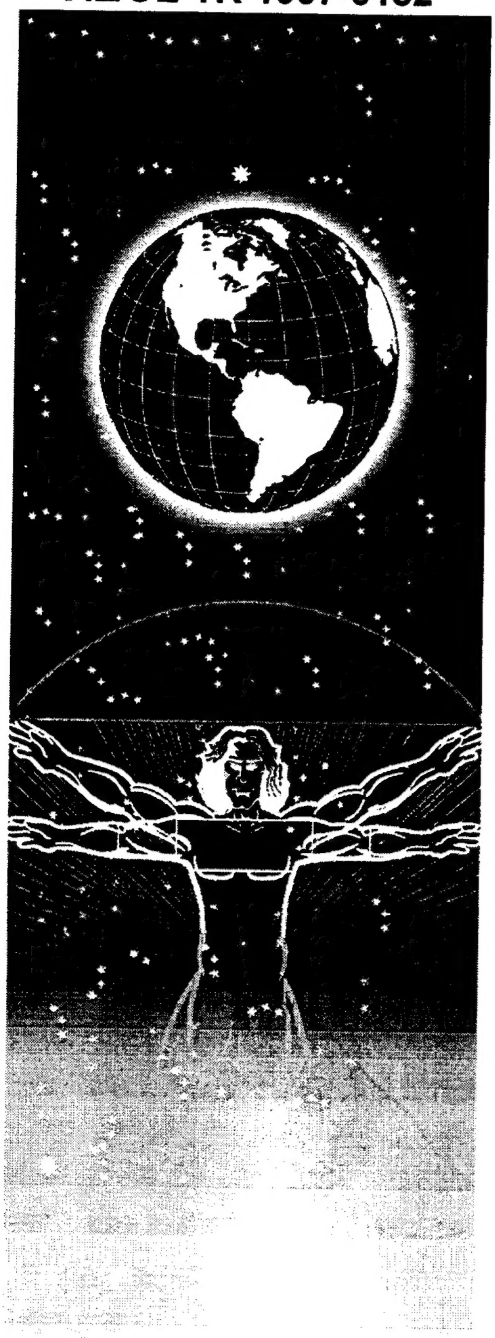

UNITED STATES AIR FORCE ARMSTRONG LABORATORY

Wastewater Characterization Survey Peterson, Falcon, and Cheyenne Mountain Air Force Bases, Colorado

Jeffrey Gillen, Captain, USAF
Doris Dohner, Master Sergeant, USAF

September 1997

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Occupational and Environmental Health Directorate
Bioenvironmental Engineering Division
2402 E Drive
Brooks AFB, TX 78235-5114

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WILLIAM J. GOODEN, Capt, USAF, BSC
Chief, Water Quality Branch

LARRY T. KIMM, Maj, USAF, BSC
Chief, Bioenvironmental Engineering Division

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Capt Jeffrey C. Gillen
MSgt Doris A. Dohner

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Personnel from the Water Quality Branch conducted a wastewater characterization survey at Peterson, Falcon and Cheyenne Mountain Air Force Bases, Colorado from 16-22 November 1995. Wastewater characterization surveys are periodically required to ensure that wastes and other potentially hazardous contaminants from the base's industrial operations and residences are not being discharged to the municipal (or federal) treatment works or directly into the receiving waters of the state without adequate treatment. Discharge of hazardous pollutants to treatment works could cause an upset in the physical, chemical, or biological treatment processes thus allowing contaminants to be potentially released into the environment. The goals of this wastewater characterization survey were (1) collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified (2) determine the quality of wastewater that is discharged to the responsible treatment works, and (3) characterize the quality of effluent discharged from individual oil water (O/W) separators and other pollution control devices from industrial processess such as silver recovery units at the base photo laboratory, medical and dental x-ray, and non-destructive inspection facilities. Also, problematic contaminants whose source end strength are unknown may be of special concern to the base.

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WASTEWATER CHARACTERIZATION SURVEY
PETERSON, FALCON, AND
CHEYENNE MOUNTAIN AIR FORCE BASES, COLORADO

SUMMARY

The Water Quality Branch from Armstrong Laboratory's Occupational and Environmental Health Directorate (AL/OEBW), Brooks Air Force Base (AFB), Texas was requested by Major Daniel Turek to conduct a comprehensive wastewater characterization survey at Peterson, Falcon, and Cheyenne Mountain Air Force Bases. Captain Jeffrey C. Gillen lead a six member consulting team from Brooks AFB during the week of 16 November 1995. The sampling team collected 750 water samples from 38 locations in six days at the three Space Command facilities. These 750 samples provided information on over 5,000 specific analyte parameters.

The goals of this combined wastewater characterization survey were to (1) collect wastewater samples from locations around the bases which would accurately characterize the base sewage and identify contributing operations, (2) determine the quality of wastewater that is discharged from the base, and (3) characterize the effluent from oil/water (O/W) separators and other pollution control devices from industrial processes such as silver recovery units at the base photo laboratory, medical and dental x-ray, and non-destructive inspection facilities. Also, during this survey, problematic contaminants of Mercury and glycols were identified to be of special concern to the base as their source and strength were unknown.

Two main problems were encountered during the survey, the first of which was the suspension of the survey during the first day of deployed sampling at all three bases due to the congressional impass concerning the federal budget. The second, more significant problem encountered was the utilization of contaminated preservatives. Locally procured preservatives were obtained in an effort to alleviate the transportation problems involved with shipping hazardous materials. The contaminated acids invalidated some of the analytical sample results for metals and glycols acquired during this survey. Specifically, six metals were found to be present in almost all of the waste samples.

The QA/QC program utilized both in the field and at the analytical laboratory identified the extent of the preservative contamination and possible sources of the induced error. After thorough review, there were no apparent identified problems in the field collection procedures or the procedures utilized at the laboratory.

Total trihalomethanes (TTHMs) were found throughout the water and wastewater systems at all three bases. TTHMs were present in the source waters obtained from the municipally treated drinking water. No concentrations exceeded the maximum contaminant level for drinking water.

Glycols were detected in almost all wastewater and quality assurance/quality control (QA/QC) samples during the entire combined survey. No logical source of the glycols could be determined from the analytical data. Internal Armstrong Laboratory Analytical Services Division (AL/OEA) QA/QC procedures and controls were reviewed and were within normal operating criteria. Recommend continued monitoring for glycols at strategic points throughout the wastewater collection systems. Obtain proper reagent grade acid from the laboratory performing the analysis to reduce the possibility of the preservative hydrochloric acid being contaminated. It is likely that the acid obtained from the Air Force Academy was contaminated.

The results discussed in this report reflect the quality of the wastewater during the period of this survey. Any changes that may have occurred to operations, shop practices, chemical usage, base population, or mission since the completion of this survey will change the nature of future discharges into the sanitary sewer collection system.

Peterson AFB Summary

The wastewater at Peterson AFB exhibited metal components of mercury and lead, and minor concentrations of pesticides and glycols. Recommend that metals monitoring be included by the base in order to determine whether the metals results should be administratively subtracted or even withdrawn from the bases statistical population of metals results.

Specifically, mercury was observed only at site P-1, the base effluent discharge point, and it exceeded the Publicly Operated Treatment Works (POTW) discharge limits. After careful review, mercury was not observed at any of the other composite sampling locations during the survey. Therefore, the source of the mercury is not likely to be from Peterson AFB but may have been captured from the civilian component of the wastewater flowing through this manhole. Recommend collecting split samples at site P-2, P-3, and P-9, when the municipality is collecting samples at the lift station immediately off main base (P-1). Request that split samples be shared with the base for independent analysis. The combination of the four samples collected by the base will further qualify and confirm the source of the mercury.

Five samples detected measurable concentrations of lead at approximately 10 times the detection limit, but still below the general discharge limits. Base effluent concentrations were diluted sufficiently as no detectable lead concentrations were measured. Operations in this zone of the base include an Air Force Reserve component metal fabrication shop. Other shops that typically have lead waste streams are battery shops, which may be located in the area. Normal Bioenvironmental Engineering surveillance activities should be able to identify the generating processes and recommend appropriate Pollution Prevention (P^2) measures to further reduce discharged lead levels.

The herbicide, Dalapon, was identified at the major sampling sites, the duplicate samples, and the background drinking water sample. None of the other QA/QC samples

or the samples from Falcon or Cheyenne Mountain indicated detectable concentrations of this herbicide. Recommend including herbicide monitoring surveillance for Dalapon in routine and non-routine drinking water and wastewater sampling efforts at Peterson AFB.

The use of Oil/Water separators (OWS) at Peterson AFB needs to be critically reviewed. Many separators are not being utilized, may be bypassed, or only receiving domestic waste (human wastes and household type cleaners). OWS that are not actively being used should have adequate plumbing to isolate and bypass the devices. Industrial facilities, such as the hangars, should not remove the OWS until proper review of the facility's mission has been conducted.

Falcon AFB Summary

Metals were detected at Falcon AFB. Recommend the continued monitoring for metals and bioenvironmental and environmental engineering reviews of processes that may generate barium, manganese, molybdenum, and nickel.

Cheyenne Mountain AFB Summary

The presence of additional metals was also a concern for Cheyenne Mountain (CM) AFB. Specifically mercury, barium, and molybdenum were measured. The mercury levels from the sanitary line indicate that a process wastewater has a mercury byproduct or an inadvertent spill may have occurred. Recommend that bioenvironmental engineering review the work sections that utilize mercury containing devices.

Cheyenne Mountain AFB should not have a significant impact on the wastewater treatment facility at Fort Carson. The effluent load from CM is highly diluted from the infiltration water coming from the internal structure of the mountain complex. Recommend continued split monitoring with Fort Carson at the boundary between the two facilities, if there continues to be a perceived problem concerning CM effluent.

WASTEWATER CHARACTERIZATION SURVEY
PETERSON, FALCON, AND
CHEYENNE MOUNTAIN AIR FORCE BASES COLORADO

INTRODUCTION

Personnel from the Water Quality Branch, Armstrong Laboratory's Occupational and Environmental Health Directorate (AL/OEBW), Brooks Air Force Base (AFB), Texas conducted a wastewater characterization survey at Peterson, Falcon, and Cheyenne Mountain Air Force Bases, Colorado from 16-22 November 1995. The survey team was lead by project officer Captain Jeffrey C. Gillen, MSgt Doris Hemenway, MSgt Richard Howell, SSgt George Fritts, SrA Patricia Esquivel, and Ms. Tammy Hollis. The survey was conducted in response to a September 1995 request made by Major Daniel Turek, Director of Bioenvironmental Engineering, Peterson AFB. A copy of the request letter is provided in Appendix A.

GENERAL DISCUSSION

Wastewater characterization surveys are periodically required to ensure that wastes and other potentially hazardous contaminants from the base's industrial operations and residences are not being discharged to the municipal (or federal) treatment works or directly into the receiving waters of the state without adequate treatment. Discharge of hazardous pollutants to a treatment works could cause an upset in the physical, chemical, or biological treatment processes thus allowing contaminants to be potentially released into the environment.

The Bioenvironmental Engineering Flight is normally the responsible agency on an Air Force base to conduct waste monitoring and characterization surveys. The Water Quality Branch of Armstrong Lab provides expert environmental engineering consultative services to bases worldwide by providing characterization surveys of this type. The goals of a wastewater characterization survey are often to (1) collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified, (2) determine the quality of wastewater that is discharged to the responsible treatment works, and (3) attempt to characterize the quality of effluent discharged from individual oil water (O/W) separators and other pollution control devices from industrial processes such as silver recovery units at the base photo laboratory, medical and dental x-ray, and non-destructive inspection facilities. Also, problematic contaminants whose source and strength are unknown may be of special concern to the base.

Sampling Strategy

Captain Jeffrey Gillen and Captain Christopher Williston conducted a pre-survey to the wastewater characterization survey at Peterson AFB, Falcon AFB, and Cheyenne

Mountain AFB on 10-13 October 1995. During this pre-survey, a sampling strategy was developed with the direct assistance of Peterson AFB personnel Major Daniel Turek, Capt Jay Vietas, and Capt Wendy Klein, bioenvironmental engineering services (BES), Ms. Leona Turek, civil engineering squadron (CES), Ms Jane Ross (Falcon CEF), and Lt Ted Munchmeyer (Cheyenne Mountain CEF). Bioenvironmental Engineering at Peterson AFB support all three bases. The goals of the sampling plan were to (1) collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified, (2) determine the quality of wastewater and the respective loading received from each base to its respective wastewater treatment works, (3) to attempt to characterize the quality of effluent discharged from existing OWS and industrial operations that may be discharging industrial pollutants such as mercury and silver effluents at Peterson AFB. Peterson AFB discharges to the Colorado Springs POTW. Falcon AFB discharges to its own federally owned treatment works (FOTW) and Cheyenne Mountain AFB discharges down the mountain to Fort Carson's FOTW.

Utility maps and base level knowledge were utilized to break each base into zones that would facilitate the identification of sampling locations. These zones assist in identifying probable organizations (generators) that may be responsible for specific pollutant releases. Sampling stations within the sanitary sewer collection system, OWS, silver recovery units, and quality control and quality assurance samples were identified at each of the bases. Process knowledge from bioenvironmental engineering and knowledge of the effluent permit limitations from civil engineering were translated into a strategy and sampling plan for this composite survey. Manholes, OWS outfalls, and other critical locations throughout the base were utilized as sampling locations based on their locations relative to industrial facilities supporting the base's operations. The sampling activities were conducted during the period 16-22 November 1995.

The survey team installed and programmed auto samplers to collect 24-hour time-proportional composite samples. Grab samples were collected from O/W separators and other specific common industrial operations out falls with historical knowledge of discharging operations. Potable water samples which represented the background sample location were also taken at each base.

The types of analysis desired to be conducted during the survey dictated the quantity and duration of the samples collected at each of the sampling locations identified. Table B-1 of Appendix B, lists the Unites States Environmental Protection Agency (USEPA) Methods used to analyze the samples, holding times, and preservation methods. Due to the large scope of this combined survey, and the difficulties at the time with shipping hazardous materials, the survey team chief asked that the preservation chemicals be obtained locally by the base bioenvironmental engineering flight.

Sampling Methods

Samples collected during the survey were analyzed in accordance with Air Force Occupational and Environmental Health Laboratory (AFOEHL) technical report, *Recommended Sampling Procedures* (reference 2). These procedures generally follow guidelines established by the USEPA.

Wastewater characterization samples were collected at each of the composite sampling sites for a 24-hour period. The samples were time-proportional composite samples collecting one sample every one-half hour. The automated composite samplers used during the survey contained a single 3-gallon glass "pickle" jar in which each sample was combined. The exterior of the pickle jar was packed with ice prior to each day of sampling to minimize the loss of volatile organic compounds (VOCs) and overall degradation of the sample. During each day of sampling the pH and temperature were measured at each site during sample collection and preparation. Physical characteristics (odor, color, etc.) of the waste samples also were noted at that time.

At the completion of the 24-hour sampling period, a representative sample was transferred from the 3-gallon glass jar to the appropriate sample containers. The samples were then preserved and properly chilled in accordance with the procedures outlined in the OEHL Sampling Guide prior to shipment. Iced coolers were then used to transport the samples via overnight express to Armstrong Laboratory's Analytical Services Division (AL/OEA) at Brooks AFB.

Potable water samples were also collected. These samples represent a background sample characterizing the overall quality of the water and the major chemical components concentration in the drinking water that enters the main base. Grab samples were collected from O/W separators, quality assurance / quality control samples were also collected at each of the bases. Mercury and silver samples were taken at Peterson in order to identify probable sources of a recurring problem with mercury in the main base effluent as reported from the municipality to base officials. These samples were collected and preserved in accordance with the AFOEHL sampling procedures. Upon completion of sample collection, the samples were preserved, chilled to 4°C overnight, and then placed in iced coolers and shipped by overnight package service to AL/OEA at Brooks AFB.

Quality Assurance/Quality Control

Field Quality Assurance/Quality Control (QA/QC):

A field QA/QC program was instituted during the wastewater characterization survey at Peterson, Cheyenne Mountain, and Falcon AFBs to ensure that a representative sample was collected and available for analysis. An auxiliary goal of the QA/QC program is to verify the accuracy of field procedures and to determine the accuracy and reproducibility of laboratory results. The field QA/QC program used during the survey

included the collection of field equipment blank, reagent blank, spike, duplicate, and background samples. Distilled, de-ionized water from the Bioenvironmental Engineering Flight was provided for the preparation of the field level QA/QC samples. This water was produced in-house utilizing bioenvironmental engineering's "Nano-Pure" laboratory filtration system.

The following samples were sent to the analytical laboratory to validate the integrity of the samples collected.

Equipment Blank Samples

Field equipment blank samples were collected and analyzed for those parameters listed in Table C-1 of Appendix C. The first blank sample was collected by pumping distilled, deionized water through the Tygon tubing of the composite sampler and into the sampler pickle jar. The second equipment blank sample was collected by pouring distilled, deionized water into the pitcher and transferring the water to the appropriate sample containers. Equipment blank samples help indicate accidental or incidental contamination that may have occurred during the sampling process and serve to verify the effectiveness of decontamination procedures. In particular, field equipment blank samples can detect contaminants that may adsorb to the inner wall of the Tygon tubing, polyethylene strainer, or the composite sampler pickle jar, and thus may potentially cause cross contamination of the samples.

Reagent and Trip Blank Samples

Reagent blank samples were collected and analyzed for the parameters listed in Table C-2 of Appendix C. These samples were collected by pouring distilled, deionized water into sample containers and preserving the samples with the appropriate preservative. Reagent blank samples were collected to determine whether the preservative method could be a source of sample contamination and to quantify any contamination introduced during sample preparation/analysis. Trip blank samples were prepared at AL/OEA by pouring distilled, deionized water into sample containers. Trip blank samples are used to detect contamination associated with the travel to and from the lab, sampling media, e.g. filter, sample bottles, etc. These samples were analyzed for purgable and aromatic VOCs also listed in Table C-2. These samples were placed in the coolers shipped from the laboratory and serve as an indication of potential cross contamination which might occur during transportation.

Spike Samples

Spike samples were prepared for those parameters listed in Table C-3 of Appendix C. Spike samples were prepared by the analytical chemist at Armstrong Laboratory. Results of spike samples are used to identify field, transportation, and sample matrix effects. In addition, spike samples indicate the accuracy of the laboratory's analytical results relative to a known concentration.

Duplicate Samples

Duplicate samples were collected and analyzed for the parameters listed in Table C-4 of Appendix C. Duplicate samples were collected by pouring wastewater from a composite sampler collection jar into appropriate sample containers. It should be noted that the wastewater in the sample collection jar had been well mixed prior to the transfer to the sample containers. Duplicate samples reflect the overall precision of the sampling or analytical methods used in the analyses.

Background Water Quality Samples

Background samples were collected in accordance to AFOEHL sampling procedures and were analyzed for the parameters listed in Table C-5 of Appendix C. Background samples were collected to determine the treated water quality of the potable water entering the sanitary sewer collection system at Peterson AFB.

Armstrong Laboratory Internal QA/QC

The AL/OEA Quality Assurance Plan establishes the guidelines and regulations necessary to meet the analytical laboratory requirements of 43 states, including Colorado, the USEPA, and private accrediting agencies. Specific QA/QC activities include inserting a minimum of one blind sample control for each parameter analyzed on a monthly basis and periodic auditing of the laboratory quality assurance items from each branch. All instruments are calibrated for each day of use, and at least one National Institute Standards and Technology/Standard Reference Materials (NIST/SRM) traceable standard and control sample is included with each analytical run. All quality control samples are plotted and tracked by the individual work sections. Corrective action is documented every time a quality assurance parameter is not met. The laboratory participates in numerous proficiency surveys and inter-laboratory quality evaluation programs, including the USEPA's Performance Evaluation Study for wastewater. The study involves analyzing samples provided by the USEPA and reporting the results for review. By participating in the study, Armstrong Laboratory's certification in wastewater analyses is implied (3).

DISCUSSION OF RESULTS

Typical characteristics of the individual constituents found in untreated domestic wastewater are reported in Table 1. Depending on the concentrations of these constituents, wastewater may be classified as strong, medium, or weak (4). These concentrations, along with the maximum permissible concentrations of wastewater discharged to the Colorado Springs POTW (Table 2), serve as standards by which the quality of Peterson AFB's wastewater may be determined. Also, analytical results of samples collected from the O/W separators indicates their contribution of pollutants loading to the sanitary sewer system.

Quality Assurance/Quality Control

QA/QC sample results are contained in Appendix C. Table C-1 shows the results of the equipment blank sample analyses. Analytical results of the first equipment blank, which was prepared by pumping distilled, deionized water through the Tygon tubing of the auto sampler, indicate measurable amounts of Oil & Grease (O/G), Total Petroleum Hydrocarbons (TPH), Kjedahl nitrogen (TKN), Total Residue (TSS), Total Dissolved Solids (TDS), total glycols, bromodichloromethane, and chloroform. Analytical results of the second equipment blank, which were prepared by again transferring distilled, deionized water as before but also utilizing the composite pickle jar as a source of possible error. Therefore the laboratory water was pumped through the sampler as before into the pickle jar prior to splitting the sample into its respective sample containers. This sample revealed presence of COD, Kjedahl nitrogen, and various metals: total chromium, copper, iron, lead, nickel, and zinc.

The reagent and trip blank sample results are depicted in table C-2. Measurable amounts of O/G, TPH, Kjedahl Nitrogen, various metals, chloroform, 1,1,2,2-tetrachloroethane, and total glycols were detected in the reagent blank sample. The trip blank sample was analyzed for purgable VOCs and aromatic VOCs. Chloroform represents the only parameter detected in the trip blank sample.

Various contaminants were detected in the above mentioned QA/QC samples. Therefore, if the parameters detected in the blank samples also were detected during the survey characterization samples (contained in Appendix D), then the characterization sample result is qualified with a flag. This qualifier is included to indicate that the presence of the parameter may not accurately characterize the quality of wastewater at that sample location. The analysis of the QA/QC program incorporated with the laboratory QA/QC program should be able to assist in determining probable indicators of the errors encountered during the survey.

Table C-3 shows the results of the spike sampling performed at Armstrong Laboratory. Performance acceptance limits (PALs) for each parameter are presented in the table. Analytical results of spike sample SS-1 indicate iron, mercury, molybdenum, TDS, total residue, and TSS concentrations do not lie within their applicable PAL. Analytical results of spike sample SS-2 indicate that COD, O/G, iron, mercury, molybdenum, TDS, total residue, and TSS concentrations do not lie within their applicable PAL. After reviewing the supporting data from AL/OEA's internal QA/QC program, no laboratory problems were observed therefore, the sample data is suspect of being contaminated from either poor field technique, preservation impurities, or background sources. The contaminants of special concern are the mercury and molybdenum which were significantly lower and higher, respectively, when compared to the cited PAL and internal QA/QC values. The other contaminant's values are only slightly outside of the PAL cited. Thus, these contaminants warrant increased

surveillance until negative documentation can be gathered to determine whether or not the concentrations were valid or outside the normal loading characteristics of the bases' system.

Table C-4 details the results of the duplicate sample collected at Site 9 on 17 November 1995. Analytical results from the duplicate sample have a cumulative average relative percent difference of 9.7 percent. The highest relative percent difference between any duplicate result of parameters contained in Table C-4 was 115 percent (TDS). This relative high percent difference associated with the duplicate solid analyses may be due to the inherent difficulty associated with collecting truly duplicate samples of solids in the field. Suspended and settleable solids tend to settle out of solution very rapidly once mixing of the sample stops and pouring of the sample into the sample containers begins.

Table C-5 shows the results of the background sampling performed on the potable water collected at the Visitor Center at the main gate to Peterson AFB. The visitor center is the first service connection nearest to the point of entry as the water enters the base. Although measurable amounts of various constituents, including COD, O/G, TPH, aluminum, solids, VOCs, and herbicides were detected in the background samples, no concentrations exceeded the maximum contaminant level for drinking water (reference 5). In addition, many parameters detected in this sample were also detected in blank samples collected for QA/QC purposes. Therefore, it was difficult to determine whether parameters detected were actually representative of the potable water distributed to Peterson AFB. After careful review of the data supporting all three surveys, the background drinking water sample supports that TTHMs may be present and that the pH is lower than normal. Therefore, if any processes on base also lower the pH of the water, the base could have trouble with its effluent pH limits. This sample also supports that background levels of mercury are not traversing through the base water system.

TABLE 1
TYPICAL COMPOSITION OF UNTREATED DOMESTIC WASTEWATER*

CONTAMINANTS	UNIT	CONCENTRATION		
		WEAK	MEDIUM	STRONG
Solids, total (TS)	mg/l	350	720	1200
Dissolved, total (TDS)	mg/l	250	500	850
Fixed	mg/l	145	300	525
Volatile	mg/l	105	200	325
Suspended solids (SS)	mg/l	100	220	350
Fixed	mg/l	20	55	75
Volatile	mg/l	80	165	275
Settleable solids	mg/l	5	10	20
Biochemical oxygen demand	mg/l	110	220	400
BOD_5, 20°C				
Total organic carbon (TOC)	mg/l	80	160	290
Chemical oxygen demand (COD)	mg/l	250	500	1000
Nitrogen (total as N)	mg/l	20	40	85
Organic	mg/l	8	15	35
Free ammonia	mg/l	12	25	50
Nitrites	mg/l	0	0	0
Nitrates	mg/l	0	0	0
Phosphorus (total as P)	mg/l	4	8	15
Organic	mg/l	1	3	5
Inorganic	mg/l	3	5	10
Chlorides	mg/l	30	50	100
Sulfate	mg/l	20	30	50
Alkalinity (as $CaCO_3$)	mg/l	50	100	200
Grease	mg/l	50	100	150
Total Coliform	number /100 ml	10^6 - 10^7	10^7- 10^8	10^7- 10^9
Volatile organic compounds (VOCs)	µg/l	<100	100-400	>400

*Metcalf and Eddy, Wastwater Engineering - Treatment, Disposal, Reuse.

TABLE 2: COLORADO SPRINGS POTW
QUANTITATIVE WASTEWATER DISCHARGE LIMITS

CONTAMINANT	PERMISSIBLE CONCENTRATION	CONTAMINANT	PERMISSIBLE CONCENTRATION
pH	≥5.5 to ≤10	Cyanide (total)	<1 mg/L
Oil/Grease	<100 mg/L	Lead (as Pb)	<0.1 mg/L
Fluorides (nondistilled)	<61.58 mg/L	Manganese	<10.0 mg/L
Arsenic (as AS)	<1.66 mg/L	Mercury (as Hg)	<0.0003 mg/L
Cadmium (as Cd)	<0.73mg/L	Nickel (as Ni)	<14.57 mg/L
Chromium (total)	<9.42 mg/L	Silver (as Ag)	<0.05 mg/L
Chromium (hexavalent)	<1.26 mg/L	Zinc (as Zn)	<5 mg/L
Copper (as Cu)	<4.96 mg/L		

mg/L = milligrams/liter

PETERSON AIR FORCE BASE
WASTEWATER CHARACTERIZATION SURVEY

BACKGROUND

Wastewater from facilities at Peterson AFB is discharged to the Colorado Springs Publicly Operated Treatment Works (POTW). Wastewater samples from nine sites, nine oil/water (O/W) separators, and three special grab sample locations within the base cantonment area were collected and analyzed for various pollutant parameters. In direct support of the survey, eight quality control quality assurance samples were also obtained.

Peterson AFB is located approximately 3 miles east of Colorado Springs, Colorado. The 1,277 acre base is home to the 21st Space Wing which supports Headquarters (HQ) Air Force Space Command. In addition, the North American Aerospace Defense Command (NORAD), the United States Space Command, Army Space Command, and 302d Reserve Airlift Wing also are stationed at Peterson AFB. Peterson AFB's mission is to support the surveillance and control of space, and to provide the warfighter reliable space support systems. Approximately 4,300 active duty military personnel, 1,300 military reserve personnel, and 3,100 civilian personnel are assigned to Peterson AFB.

Several types of industrial facilities are located at Peterson AFB. These facilities include, but are not limited to: aircraft and vehicle washracks; aircraft maintenance, to include corrosion control, fuel cell repair, and nondestructive inspection (NDI); aerospace ground equipment (AGE) and motor vehicle maintenance; and other mission support facilities, such as the Area Dental Laboratory and the base medical facility. Another primary contributor to the wastewater system is the on-base residential area and the other administrative support facilities associated with military bases.

Existing wastewater facilities at Peterson AFB include pump stations, oil/water separators, and a sanitary sewage collection system. Facilities adjacent to the flight line are connected to a semi-dedicated industrial wastewater collection system. The sanitary sewage system collects wastewater from all industrial and domestic activities located easterly of the flight line area of the base. This wastewater is discharged, via one sewer main, to the Colorado Springs POTW located approximately 6 miles southeast of the base. At the time of the survey, no written permits were known to be maintained by Peterson AFB, however, the Colorado Springs municipal POTW prescribes general prohibitions and concentration limits for wastewater discharged to their facility. A summary of the concentration limits is provided in Table 2.

Sampling Strategy

The sampling activities were conducted during the period 16-22 November 1995. Nine composite sampling locations within the sanitary sewer system, nine O/W separators, and eight quality control and quality assurance samples were selected based

on their locations relative to industrial facilities supporting Peterson AFB operations. These locations are summarized in Table 3.

TABLE 3
SAMPLING LOCATION DESCRIPTIONS

Sampling Location	Sources of Wastewater
Site 1, Peterson AFB Effluent	Lift station located on the far side of the Peterson runway system, exterior to the controlled regions of the airfield. The municipality currently utilizes a secured lift station as its monitoring point. The base established its sampling location immediately downstream of the lift station. This same sampling location will be utilized to facilitate representative and correlated data from a known point.
Site 2, Main Industrial Arterial, Manhole 2.	This manhole facilitates the southern most sector of the main cantonment area along Kincheloy Loop and the golf course.
Site 3, Main Industrial Arterial, Manhole 11.	This manhole facilitates the main area of the base including the majority of the flightline, support agencies, and military family housing.
Site 4, Housing, Manhole 141	This location will enable determining whether military family housing is significantly contributing to the problematic discharges being experienced at Peterson AFB.
Site 5, Area Dental Laboratory (ADL)	The Area Dental Lab manufactures and provides dental prosthetics for Air Force personnel. ADL is located in the southeastern area of the base. The manhole used is located north of the lab just prior to the end of the runway.
Site 6, Base AGE, NDI; Manhole 69	Facilities situated in the west sector of the main cantonment area between Hamilton Avenue and Duluth Avenue.
Site 7, AF Reserve Metal Fabrication Shop, Manhole 34a	Facilities located in the west sector of the main cantonment area between Hamilton Avenue and Ent Avenue.
Site 8, Supply Warehousing, Manhole 45	Facilities situated at the corner of Hamilton & Paine Street.
Site 9, HQ Space Command, Manhole 514	Facilities located along the northern sector of Paine Street, including the HQ building and civil engineer. The sampling location is immediately outside the Stewart Gate.

Sampling Location	Sources of Wastewater
3 Special Samples a) Potable Water, Background Sample b) Medical / Dental Clinic manhole #110 c) PMEL,	a) Men's restroom at the main gate visitor center. This sample provides critical background information. b) Medical Clinic, grab sample c) PMEL base age , grab sample
7 QA/QC Special Samples; a) Old Child Care Facility b) 2 Duplicates c) 5 Blanks & Spikes	a) Potable Grab sample for Langlier Index b-c) QA/QC protocols for appropriate controls on wastewater samples and field procedures
9 Oil / Water Separators	a) Maintenance Dock building 214, b) Aircraft Engine Inspection building 502, c) Aerospace Ground Equipment (AGE), building 503 d) Aircraft Maintenance Building 625, e) Autohobby Building 640, f) Old Vehicle Maintenance building 1255, g) Material Supply building 1322, h) Washrack building 1229, and i) Civil Engineering Washrack facilities, buildings 1324

The survey team installed and programmed an auto sampler to collect 24-hour time-proportional composite samples at Sites 1-9. Wastewater samples were collected daily for seven days at Sites 1, 3, 9 and for three days at Sites 2 and 4-8. Grab samples were collected from nine of the twelve O/W separators and one potable water source which represented the background sample location. Table 4 lists the collection periods and the chemical analyses performed on the collected samples. Table B-1 of Appendix B, lists the Unites States Environmental Protection Agency (USEPA) Methods used to analyze the samples, holding times, and preservation methods. Due to the large scope of this combined survey, and the difficulties at the time with shipping hazardous materials, the survey team chief asked that the preservation chemicals be obtained locally by the base bioenvironmental engineering flight.

TABLE 4
ANALYSES PERFORMED

Sampling Location	Analytical Requirements
Site 1, Peterson AFB Effluent Site 9, HQ Space Command, manhole 514	**Sample Period**: 7 days **Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 metal screen, EPA Methods 601/602 VOCs, COD, O/G, TPH, Ammonia, Kjeldahl Nitrogen (total), Phenols, Total Residue, TDS, TSS, Surfactants-MBAs, Total Glycols, EPA Method 615 Herbicides, pH, and Temperature.
Site 2, Main Industrial Arterial, Manhole 2.	**Sample Period**: 3 days **Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 metal screen, COD, O/G, TPH, Ammonia, Kjeldahl Nitrogen (total), Phenols, EPA Method 615 Herbicides, pH, and Temperature.
Site 3, Main Industrial Arterial, Manhole 11.	**Sample Period**: 7 days **Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 metal screen, EPA Methods 601/602 VOCs, COD, O/G, TPH, Ammonia, Kjeldahl Nitrogen (total), Phenols, Total Residue, TDS, TSS, Surfactants-MBAs, Total Glycols, EPA Method 615 Herbicides, pH, and Temperature.
Site 4, Housing, Manhole 141 Site 6, Base AGE, NDI; manhole 69 Site 7, AF Reserve Metal Fabrication Shop, manhole 34a Site 8, Supply Wharehousing, manhole 45	**Sample Period**: 3 days **Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 metal screen, COD, O/G, TPH, Phenols, pH, and Temperature.
Site 5, Area Dental Laboratory	**Sample Period**: 3 days **Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 metal screen, COD, O/G, TPH, Phenols, Total Residue, TDS, TSS, Surfactants-MBAs, pH, and Temperature.

Sampling Methods

Wastewater characterization samples were collected at each of the nine sites for a 24-hour period. The samples were time-proportional composite samples collecting one sample every one-half hour. The automated composite samplers used during the survey contained a single 3-gallon glass "pickle" jar in which each sample was combined. The exterior of the pickle jar was packed with ice prior to each day of sampling to minimize the loss of volatile organic compounds (VOCs) and overall degradation of the sample. During each day of sampling the pH and temperature were measured at each site during sample collection and preparation. Physical characteristics (odor, color, etc.) of the waste samples also were noted at that time.

At the completion of the 24-hour sampling period, a representative sample was transferred from the 3-gallon glass jar to appropriate sample containers. The samples were then preserved and properly chilled in accordance with the procedures outlined in the OEHL Sampling Guide prior to shipment. Iced coolers were then used to transport the samples via overnight express to AL/OEA at Brooks AFB.

Grab samples were also collected from nine O/W separators, seven quality assurance quality control samples, and mercury and silver samples were taken from the base medical facility and Precision Maintenance Equipment Laboratory (PMEL). A potable water sample was collected from the Security Police Visitor Center on Peterson Blvd. This sample is a representative background sample characterizing the overall quality of the water and the major chemical components concentration of the drinking water that enters the main base. These samples were collected and preserved in accordance with the AFOEHL sampling procedures. Upon completion of sample collection, the samples were preserved, chilled to 4°C overnight, and then placed in iced coolers and shipped by overnight package service to AL/OEA at Brooks AFB.

Site Descriptions

Nine sites and the special sampling locations in the main cantonment area of Peterson AFB were selected as sampling stations. Sites were selected to determine the source of contaminants present in the Peterson AFB sanitary sewer system, to determine the quality of wastewater discharged to the Colorado Springs POTW, and to determine the quality of O/W separator effluent. An additional location was selected as an additional background sampling station. The background sampling station was selected to determine the quality of potable water present in the Peterson AFB sanitary sewer system. The following site descriptions represent the sampling locations selected for this survey.

Site P-1, Base Discharge Point

Samples obtained from Site P-1 were collected from a discharge point located in the southeastern sector of the base, northwest of the municipal terminal. Samples

collected at this location represent the quality of wastewater being discharged from Peterson AFB to Colorado Springs POTW. Seven 24-hour, time-proportional composite samples were collected at this site over a 7-day period (16-22 November 1995). This sampling location is immediately downstream of the secure lift station that the municipality utilizes to monitor the effluent from Peterson AFB. The combination of Site P-1 and Sites P-2, P-3, and P-9 should adequately capture characteristic wastes from the base as well as indicate other possible contributor sources.

Site P-2, Manhole #2

Samples obtained from Site P-2 were collected from Manhole #2 located along the southeast portion of Hamilton Avenue. Wastewater samples collected from this location are representative of activities in the southern-most sector of the main cantonment area along Kincheloe Loop. Three 24-hour, time-proportional composite samples were collected at this location over a 5-day period (17-21 November 1995).

Site P-3, Manhole #11

Samples obtained from Site P-3 were collected at Manhole #11 located immediately northwest of Site 2 along Hamilton Avenue inside the airfield perimeter fence. Wastewater samples collected from this location represent activities which occur in the majority of the base. The wastewater effluent must either flow through Site 2 or Site 3 to reach Site 1. Seven 24-hour, time-proportional composite samples were collected at this location over a 7-day period (16-22 November 1995).

Site P-4, Military Family Housing, Manhole #141

Samples obtained from Site P-4 were collected at Manhole #141 located in the central sector of the base, capturing the domestic waste effluent associated with the residential area. Three 24-hour, time-proportional composite samples were collected at this location over a 5-day period (17-21 November 1995).

Site P-5, Area Dental Laboratory

The Area Dental Lab (ADL) manufactures and provides dental prosthetics for Air Force members. ADL is located in the southeastern area of the base. Samples obtained from Site P-5 were collected from the manhole located north of the lab just prior to the end of the runway. Three 24-hour, time-proportional composite samples were collected at this location over a 5-day period (17-21 November 1995). The ADL is a possible effluent source for heavy metals such as mercury and beryllium.

Site P-6, Manhole #69

Samples obtained from Site P-6 were collected from Manhole #69 located in the west sector of the main cantonment area, between Hamilton Avenue and Duluth Avenue.

This station receives wastewater from facilities located in the west-central sector of the base between Hamilton Avenue and Stewart Avenue. Three 24-hour, time-proportional composite samples were collected at this location over a 5-day period (17-21 November 1995).

Site P-7, Manhole #34a

Samples obtained from Site P-7 were collected from Manhole #34a located north of the intersection of Hamilton Avenue and Truax Street. Wastewater samples collected from this location represent the Air Force Reserve metal fabrication shop, the base auto hobby, arts & crafts shop and any other facility bounded between Paine St., Ent Avenue, Traux St., and Hamilton Ave. Three 24-hour, time-proportional composite samples were collected at this location over a 5-day period (17-21 November 1995).

Site P-8, Supply Warehouse, Manhole #45

Samples obtained from Site P-8 were collected at Manhole #45 located north of the intersection of Hamilton Avenue and Paine Street. Wastewater samples collected from the station represent activities at facilities located along Paine Street such as Bioenvironmental Engineering, the main Civil Engineering facility. Three 24-hour, time-proportional composite samples were collected at this location over a 5-day period (17-21 November 1995).

Site P-9, Stewart Gate, Manhole #514

Samples obtained from Site P-9 were collected from Manhole #514 located in the northwest sector of the main cantonment area, south of the intersection of Stewart Avenue and Ent Avenue. Wastewater samples collected from the station are representative of activities at facilities situated along the northern sector of Paine Street, specifically, the Headquarters Space Command facility and the AAFES shoppette. Seven 24-hour, time-proportional composite samples were collected at this location over a 7-day period (16-22 November 1995).

Grab Samples

Oil/Water Separators

Grab samples were collected from nine of twelve O/W separators located throughout the base. The locations of the sampled O/W separators are as follows: 4) Maintenance Dock Building 214, 5) Aircraft Engine Inspection facility, 6) Aerospace Ground Equipment (AGE) facility, 7) Aircraft Maintenance Building 625, 8) Auto Hobby facility, 9) old Vehicle Maintenance facility, 10) Material Supply facility, 11) Washrack Building 1229, and 12) Civil Engineering Squadron Washrack. These samples were collected to attempt to characterize the quality of effluent discharged from each O/W separator. All O/W separator samples were collected on 20 November 1995.

Background Sample Location

A drinking water grab sample was collected from the new main gate visitors center on Peterson Blvd. This sample is a representative background sample characterizing the overall quality of the water and the major chemical components concentration of the drinking water that enters the main base. The sample was pulled from the men's lavatory sink. Drinking water from the municipality enters the base near this location and the visitor center is the base's first service connection. The faucet screen was removed and the water was allowed to run for a short period of time. The sample was collected on 16 November 1995. A grab sample was also taken at the new Child Care facility. Major Dan Turek desired to measure the Langlier Index of the water at the facility in order to determine the water's aggressiveness. This sample was taken from the food preparation sink in the kitchen with the assistance of Mr. Mike Puleo.

Industrial Sample Locations

Grab samples were collected in order to determine the possible source of mercury effluent concentrations reported by the municipality being discharged from Peterson AFB. Other contaminants of concern were silver and glycols. Possible operations at Peterson AFB that may contribute mercury include the 1) Medical X-Ray facility, 2) Dental Clinic (x-ray and laboratory), 3) PMEL facility, and 4) Non-Destructive Inspection Facility. The waste from medical treatment facility (including the dental clinic) did not allow capturing the waste at the point of generation. Therefore, a single grab sample was collected at the junction of the combined sewer out fall into the general waste collection sewer system at Manhole #110. The non-destructive inspection facility which normally produces photographic wastes was not operational at the time of the survey, therefore, no samples were collected at that location.

DISCUSSION OF RESULTS

Wastewater Samples

This section describes the normalized analytical results of this survey. The anomalies identified during the QA/QC program should be of assistance in determining the true characteristics of the waste stream at that particular time of the survey. The sampling sites are discussed individually. A tabular summary of the data results from the wastewater sample are in Appendix D.

Site P-1, Base Discharge Point

Wastewater samples collected at Site P-1 are typically representative of the quality of water that Peterson AFB discharges to the Colorado Springs POTW. Table D-1 reports the results of samples collected at Site P-1 over the period 16-22 November

1995. In general, the contaminant concentrations detected in the samples collected at Site P-1 are typical of a weak to moderate domestic wastewater.

Analytical results reported in Table D-1 indicate that measurable amounts of various constituents are present in wastewater at the base discharge point. Parameters whose concentrations exceeded Colorado Springs POTW permissible concentrations include O/G (maximum concentration of 1,760 mg/L), mercury (maximum concentration of 0.0057 mg/L), and pH (5 units). Parameters detected whose concentrations also should be noted, but are not restricted by the Colorado Springs POTW, include COD (186 mg/L to 379 mg/L), TPH (maximum concentration of 352 mg/L), phenols (maximum concentration of 50 µg/L), total residue (maximum concentration of 562 mg/L), TDS (maximum concentration of 512 mg/L), chloroform (maximum concentration of 5.3 µg/L), 1,4-dichlorobenzene (maximum concentration of 1.3 µg/L), and total glycols (maximum concentration of 1,381.16 mg/L). Additional parameters detected in samples collected at Site P-1 include ammonia, Kjeldahl nitrogen, various metals, TSS, surfactants-MBAs, and Dalapon.

Site P-2, Manhole #2

Wastewater samples collected at Site P-2 are typically representative of activities which occur in the southern most sector of the main cantonment area along Kincheloy Loop. Table D-2 contains the results of samples collected at Site P-2 over the period 17-21 November 1995. Concentrations of contaminants detected in samples collected at Site P-2 are typical of a weak domestic wastewater.

Analytical results contained in Table D-2 indicate that the only parameters which exceeded Colorado Springs POTW permissible concentrations include O/G (1,120 mg/L), and pH (5 units). Both parameters were detected in the sample collected on 21 November 1995. Additional parameters detected in samples collected at Site P-2, but not restricted in concentration by the POTW, include COD, TPH, ammonia, Kjeldahl nitrogen, phenols, various metals, and Dalapon. No measurable concentrations of mercury were detected at this sampling location during the period of the survey.

Site P-3, Manhole #11

Wastewater samples collected at Site P-3 are typically representative of activities which occur in the south-central sector of the main cantonment area between Peterson Boulevard and Mitchell Street. Table D-3 contains the results of samples collected at Site P-3 over the period 16-22 November 1995. Concentrations of contaminants detected in samples collected at Site P-3 are typical of a weak to moderate domestic wastewater.

Analytical results reported in Table D-3 indicate that the only parameter which exceeded Colorado Springs POTW permissible level is pH (5 units) which was measured on 21 November 1995. Parameters whose concentrations exceeded that of a typical weak domestic wastewater include total residue (6,861 mg/L), TDS (1,284 mg/L), and glycols

(1,238 mg/L). Additional parameters detected in samples collected at Site P-3, but not restricted in concentration by the Colorado Springs POTW, include COD, TPH, ammonia, Kjeldahl nitrogen, phenols, various metals, TSS, surfactants-MBAs, chloroform, and dalapon. No measurable concentrations of mercury were detected at this sampling location during the period of the survey.

Site P-4, Manhole #141

Wastewater samples collected at Site P-4 are typically representative of activities which occur in the northern sector of the base and on the northeast side of Peterson Boulevard. Table D-4 contains the results of samples collected at Site P-4 over the period 17-21 November 1995. Concentrations of contaminants detected in samples collected at Site P-4 are typical of a weak domestic wastewater.

Analytical results contained in Table D-4 indicate that the only parameter which exceeded Colorado Springs POTW permissible level is pH (5 units) which was measured on 21 November 1995. Additional parameters which include COD, O/G, TPH, phenols, and various metals, were detected but their concentrations were low.

Site P-5, Area Dental Lab

Wastewater samples collected at Site P-5 represent the activities which occur from the ADL. Table D-5 contains the results of samples collected at Site P-5 over the period 17-21 November 1995. Concentrations of contaminants detected in samples collected at Site P-5 are typical of a weak domestic wastewater.

Analytical results contained in Table D-5 indicate that the only parameter which exceeded Colorado Springs POTW permissible level is pH (5 units) which was measured on 21 November 1995. Parameters detected whose concentrations also should be noted, but are not restricted by the Colorado Springs POTW, include COD (maximum concentration of 340 mg/L), phenols (maximum concentration of 35 µg/L), total residue (maximum concentration of 403 mg/L), and TDS (maximum concentration of 268 mg/L). Trace levels of TPH, various metals, TSS, and surfactants-MBAs also were detected in samples collected at Site P-5.

Site P-6, Manhole #69

Wastewater samples collected at Site P-6 are typically representative of activities which occur in the west-central sector of the base between Hamilton Avenue and Stewart Avenue. Table D-6 contains the results of samples collected at Site P-6 over the period 17-21 November 1995. Concentrations of contaminants detected in samples collected at Site 6 are typical of a weak to moderate domestic wastewater.

Analytical results reported in Table D-4 indicate O/G (104 mg/L) and pH (5 units) were parameters which exceeded Colorado Springs POTW permissible concentrations.

Parameters detected whose concentrations also should be noted, but are not restricted by the Colorado Springs POTW, include: COD (maximum concentration of 422 mg/L), and phenols (maximum concentration of 139 µg/L). Trace levels of various metals and TPH were also detected in samples collected at Site P-6.

Site P-7, Manhole #34a

Wastewater samples collected at Site P-7 are typically representative of activities which occur in the west sector of the main cantonment area between Hamilton Avenue and Ent Avenue. Table D-7 contains the results of samples collected at Site P-7 over the period 17-21 November 1995. With the exception of COD, concentrations of contaminants detected in samples collected at Site 7 are typical of a weak domestic wastewater. COD levels in Site P-7 samples are characteristic of a moderate to strong domestic wastewater.

Analytical results contained in Table D-7 indicate pH (5 units) was the only parameter which exceeded Colorado Springs POTW permissible concentration. Parameters detected whose concentrations also should be noted, but are not restricted by the Colorado Springs POTW, include COD (maximum concentration of 716 mg/L), and phenols (maximum concentration of 46 µg/L). Trace levels of O/G, various metals, and TPH were detected in samples collected at Site P-7.

Site P-8, Manhole #45

Wastewater samples collected at Site P-8 are typically representative of activities which occur at facilities along Paine Street. Table D-8 contains the results of samples collected at Site 8 over the period 17-21 November 1995. With the exception of one O/G analytical result, concentrations of contaminants detected in samples collected at Site P-8 are typical of a weak domestic wastewater.

Analytical results contained in Table D-8 indicate O/G (192 mg/L) was the only parameter which exceeded Colorado Springs POTW permissible concentration. Parameters detected whose concentrations also should be noted, but are not restricted by the Colorado Springs POTW, include COD (maximum concentration of 355 mg/L), TPH (maximum concentration of 180 mg/L) and phenols (maximum concentration of 60 µg/L). Trace levels of various metals were detected in samples collected at Site P-8.

Site P-9, Manhole #514

Wastewater samples collected at Site P-9 are typically representative activities which occur at facilities along the northern sector of Paine Street. Table D-9 contains the results of samples collected at Site P-9 over the period 16-22 November 1995. Concentrations of contaminants detected in samples collected at Site P-9 are typical of a strong domestic wastewater.

Analytical results contained in Table D-9 indicate O/G (maximum concentration of 1,152 mg/L) and pH (as low as 4 units) are the parameters which exceed Colorado Springs POTW permissible levels. Parameters detected whose concentrations should be also noted, but are not restricted by the Colorado Springs POTW, include COD (maximum concentration of 958 mg/L), TPH (maximum concentration of 640 mg/L), Kjeldahl Nitrogen (maximum concentration of 135 mg/L), phenols (maximum concentration of 69 µg/L), total residue (maximum concentration of 1,710 mg/L), TDS (maximum concentration of 1,632 mg/L), TSS (maximum concentration of 400 mg/L), chloroform (maximum concentration of 7.5 µg/L), toluene (maximum concentration of 2.6 µg/L), dalapon (maximum concentration of 22.9 µg/L), and total glycols (maximum concentration of 1,692.24 µg/L). Trace levels of various metals were also detected in samples collected at Site P-9. No measurable concentrations of mercury were detected at this sampling location during the period of the survey.

Grab Samples: Grab samples were collected in order to characterize the quality of effluent discharged from nine of the twelve O/W separators. All O/W separator samples were collected on 20 November 1995. Table D-10 contains analytical results of these samples.

Effluent grab samples at the O/W separators located at Maintenance Dock Building 214, Aircraft Engine Inspection, Auto Hobby, and old Vehicle Maintenance facilities contained various contaminants whose levels exceeded the Colorado Springs POTW permissible concentrations (See Table D-10 in Appendix D). The highest levels of O/G (7,600 mg/L), TPH (5,760 mg/L) and phenols (1,960 µg/L) were detected at the aircraft engine inspection facility. No BNAs were detected in samples collected from the PMEL facility. The highest levels of total glycols (598.68 µg/L) were detected in samples collected from the Washrack Building 1229.

A grab sample from the medical facility was taken since there was no access to the effluent from the silver recovery units at the dental and medical x-ray processor units. No measurable concentrations of silver were detected at this location, although mercury was detected (0.003 mg/L) in this grab sample.

The grab sample from the PMEL facility did not indicate measurable concentrations of mercury, or surfactants (MBAs). The chemical oxygen demand measured 30 mg/L at this location.

CONCLUSIONS AND RECOMMENDATIONS

Armstrong Laboratory Occupational and Environmental Health Directorate personnel stationed at Brooks Air Force Base (AFB), TX conducted a wastewater characterization survey at Peterson AFB from 16-22 November 1995. The sampling team also concurrently surveyed the wastewater systems at Falcon and Cheyenne Mountain AFBs. The goals of the survey were to (1) characterize the base sewage and allow contributing operations to be identified, (2) determine the quality of wastewater and the

respective loading received from each base to its respective wastewater treatment works, and (3) attempt to characterize the quality of effluent discharged from existing O/W separators and other industrial operations.

Quality Assurance Quality Control

The simultaneous composite surveys at Peterson, Falcon, and Cheyenne Mountain AFBs incorporated the requirements of an expanded, combined QA/QC program. QA/QC samples utilized during this survey included equipment blanks, reagent and trip blanks, spike samples, duplicate samples, and background samples. Initial survey results indicated that the wastewater at all three facilities contained elevated characteristics of specific contaminant parameters not normally associated with Air Force facilities that have a light industrial operations support mission. Therefore, the samples at all three facilities were also checked against each other for trends that would assist in determining the possible sources of any contaminant parameter measured during the survey.

Initially, the equipment blank results indicated that field sampling procedures may have contributed to contaminating the samples. Reagent blank analytical results also indicated that the preservation reagents into the sample containers may have contributed to incidental contamination of the samples. Both spike samples exhibited parameter concentrations which did not lie within their respective PAL. Therefore, the accuracy of the analytical results for these parameters has been uncertain from the beginning and can not be qualified. Duplicate sample analytical results have a cumulative average relative percent difference of 9.7 percent and the highest relative percent difference of 115 percent exhibited in the TDS analysis. A background sample of potable water, collected from Peterson's main gate visitor center, revealed measurable amounts of various parameters including: COD, O/G, TPH, Kjeldahl nitrogen, metals, solids, dalapon, bromodichloromethane, chloroform, total trihalomethanes, and pH.

After reviewing the internal QA/QC program and specific laboratory samples analyzed with the field samples, the laboratory was ruled out as a possible source of error on the analytical results reported in this report. With the assistance of Lt Col Dunovant, Chief Analytical Services AL/OEA, all the sample results were reviewed for possible sources of error and contamination. After consulting with Capt Klein about the initial results of the surveys, it is highly likely that sources of contamination can be attributed to three likely sources: One, the "nano-pure" laboratory water filtration system that Peterson AFB bioenvironmental engineering has utilized for QA/QC rinseate and source water for QA/QC samples; two, unknown quality of preservative reagents. Specifically, the nitric acid may not have been of high quality "laboratory reagent grade" thus having low levels of contaminants already in solution. The hydrochloric acid may also have been tainted causing inaccurate measurements for glycols or three, TTHMs components being present in the source waters obtained from the municipally treated drinking water. Although no concentrations exceeded the maximum contaminant level for drinking water, the pH level

was at the lower limits (≥5 units) and one sample was measured below (4 units at P-9) the Colorado Springs POTW permissible concentration.

Volatile Organic Compounds

Analytical results of the reagent blank and the trip blank sample revealed chloroform was the only purgable aromatic VOC detected. After reviewing the results of the internal QA/QC program at Armstrong Laboratory and the combined results from the three simultaneous surveys at Peterson, Falcon, and Cheyenne Mountain Air Force Bases, it is highly likely that the drinking water systems at all Peterson and Cheyenne Mountain have TTHMs present. This was distinguishable after reviewing the results from the storm drain line from Cheyenne Mountain and the drinking water supply for Falcon AFB. This sample was a grab sample comprised of inflow and infiltration water which flows naturally through the mountain and is discharged into a separate collection system and voided from the internal areas of the mountain. The infiltration water also provides the facility a natural, alternate source of drinking water. The background drinking water sample taken from the municipal source also exhibited the presence of TTHMs. After comparing all the background drinking water samples, Cheyenne Mountain's infiltration wastewater line exhibited no TTHM concentrations, and multiple TTHM components were present in all the purchased drinking water systems at Peterson and Cheyenne Mountain and their respective receiving wastewater streams. This suggests that the potable water purchased from the municipality may have very low levels of TTHM.

Recommendation

Include monitoring surveillance of Chloroform and TTHMs in routine and non-routine drinking water and wastewater sampling efforts at all three Air Force Bases until the source of the TTHMs and their precursors can be determined.

Metals

Another area of interest was the recurrent presence of specific metals in almost all samples: wastewater, background potables, and QA/QC. After reviewing the internal QA/QC results from AL/OEA, it is suspected that the nitric acid preservative was not of laboratory grade quality and suspect of being tainted. Due to the large scope of this combined survey, and the difficulties at the time with shipping hazardous materials, the survey team chief asked that the preservation chemicals be obtained locally by the base bioenvironmental engineering flight. The nitric acid was obtained from the Air Force Academy and its purity was assumed to be satisfactory. A sample of all the preservatives used in the survey were not retained or analyzed for quality control assurance purposes. The general trend of all the sample results suggest that the nitric acid was contaminated with low levels of the specific metals: aluminum, chromium, copper, iron, lead, and zinc. The sample concentrations measured with these six metals still do not pose a direct threat of exceeding discharge prohibitions. The hydrochloric acid was also suspected of

tainting the glycol results. A review of the results was conducted to determine if the concentrations were uniform and could thus be administratively eliminated. These specific metals should be tracked more closely to ensure whether these results were singular in occurrence or truly reflective the characteristics of the waste stream.

Recommendation: Future metals monitoring should be included by the base in order to determine whether the metals results should be administratively subtracted or even withdrawn from the base's statistical population of metals results.

Mercury

Mercury levels observed at site P-1, base effluent, exceeded the POTW discharge limits. After careful review, mercury was not observed at any of the other composite sampling locations during the survey, specifically sites P-2, P-3, and P-9. Therefore, the source of the mercury is not likely to be from Peterson AFB but may have been captured from the civilian component of the wastewater flowing through this manhole.

Recommendation: Collect samples at site P-2, P-3, and P-9, when the municipality is collecting samples at the lift station immediately off main base (P-1). Request that split samples be shared with the base for independent analysis. The combination of the four samples collected by the base will further qualify and confirm the source of the mercury.

Lead:

Measurable lead levels were observed at Sites P-7, P-8, and P-9. Of the six samples taken at Sites P-7 and P-8, five samples were approximately 10 times the detection limit, but still below the general discharge limits. Base effluent concentrations are being diluted sufficiently as no detectable lead concentrations were measured. Operations in this zone of the base include Air Force Reserve components including a metal fabrication shop. Other shops that typically have lead waste streams are battery shops, which may be located in the area. Normal

Bioenvironmental Engineering surveillance activities should be able to identify the generating processes and recommend appropriate Pollution Prevention (P^2) measures to further reduce discharged lead levels.

Recommendation: Increase bioenvironmental engineering surveillance activities of industrial workplace operations that include molybdenum (Site P-9) and lead (Sites P-7 through-9) in their processes. Identify the operation at the base hospital that incorporates mercury in its process and recommend appropriate P^2 measures to further reduce or eliminate discharged levels of these metals.

Pesticides

The herbicide Dalapon was identified in the major Sites P-1, 2, 3, and 9, the duplicate samples collected at site P-9, and the background drinking water sample. None of the other QA/QC samples or the samples from Falcon or Cheyenne Mtn indicated detectable concentrations of this herbicide.

Recommendation: Include herbicide monitoring surveillance for Dalapon in routine and non-routine drinking water and wastewater sampling efforts at Peterson AFB.

Glycols

Glycols were detected in almost all wastewater and QA/QC samples during the entire combined survey. No logical source of the glycols could be determined from the analytical data. AL/OEA QA/QC procedures and controls were reviewed and were within normal operating criteria.

Recommendation: Continued monitoring for glycols at strategic points throughout the wastewater collection system. Obtain proper reagent grade acid from the laboratory performing the analysis to reduce the possibility of the preservative hydrochloric acid being contaminated. It is likely that the acid obtained from the Air Force Academy was contaminated.

Oil/Water Separators

The analytical results indicate that potentially hazardous substances are being discharged to the Peterson AFB sanitary sewer system by various industrial activities on the base. One possible source of contamination is the oil/water separators. The untreated wastewater from the oil/water separators combines with other effluent and is discharged to the Colorado Springs POTW. Three parameters (oil and grease, mercury, and pH) were detected at Site P-1, the base discharge point, whose levels exceeded those permitted by the Colorado Springs POTW. Oil and grease concentrations are likely generated from the zone sampled by Site P-9.

Recommendation: Peterson AFB needs to re-evaluate the use of its oil/water separators and initiate a periodic maintenance program. Many separators are not being utilized and are either bypassed or are receiving domestic waste only. Upon inspection, the large oil/water separator south of Manhole #535 appears to be receiving only domestic wastes at very low flow volumes. The large hangar facility south of the Manhole #535 was not being utilized for industrial maintenance operations during the survey.

pH

Low concentrations of pH at Site P-1 on 18 and 21 November 1995 were also exhibited throughout the base during the survey. The pH measurements on 21 November 1995 reflect an overall trend throughout the base. The pH measurement at P-1 on 18 November 1995 however, does not directly coincide with any other site. The source for the low pH condition at Site P-1 may becoming from the zone supporting the Site P-9 location.

Recommendation: Continue to monitor pH utilizing a calibrated pH meter rather than the colormetric method to verify the ambient pH of the source waters and the effluents being generated at Peterson AFB.

FALCON AIR FORCE BASE

INTRODUCTION

Falcon AFB maintains a primary wastewater treatment plant which discharges to a series of leachfields. At the time of the survey, Falcon AFB had a NPDES permit for its wastewater effluent. Wastewater samples from five sites, three O/W separators, and the dining hall grease trap within the base cantonment area were collected and analyzed for various pollutant parameters. The goals of the survey were (1) to collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified, (2) determine the treatment effectiveness of the wastewater treatment plant, and (3) attempt to characterize the quality of effluent discharged from existing O/W separators and the grease traps.

Background

Falcon AFB is located approximately 20 miles east of Colorado Springs, Colorado. Falcon AFB is home to the 50th Space Wing which supports the Space Warfare Center. The Space Warfare Center mission is to fully integrate theater force enhancement of the war fighter through the use of space support systems for navigation, intelligence, communications, weather, and theater ballistic missile warning.

Falcon AFB industrial activities are best described as light. These facilities include, but are not limited to: vehicle washracks, motor vehicle maintenance, general engineering maintenance, light electronic maintenance and repair, and other mission support facilities.

The existing wastewater facilities at Falcon AFB incorporate O/W separators and a dining hall grease trap draining into a central sanitary sewer collection system. The sanitary sewer also receives industrial wastewater from various facilities at the base. This wastewater is discharged to a wastewater treatment plant located on base with the final effluent being discharged to an infiltration basin located on the far south perimeter of the facility. Falcon AFB maintains an operating NPDES permit for the treatment plant.

Sampling Strategy

Captain Jeffrey Gillen and Captain Christopher Williston conducted a wastewater characterization presurvey at Falcon AFB on 10-13 October 1995. During this presurvey, a sampling strategy was developed with the assistance of Major Daniel Turek, Captain Jay Vietas, and Captain Wendy Klein, Bioenvironmental Engineering, Peterson AFB, and Ms Jane Ross, environmental flight, Civil Engineering, Falcon AFB. The goals of the sampling plan were to: (1) collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified, (2) determine the treatment effectiveness of the wastewater treatment plant,

and (3) attempt to characterize the quality of effluent discharged from existing O/W separators and the grease traps. Table 5 indicated Falcon AFB, NPDES Discharge Limits.

TABLE 5
FALCON AFB NPDES PERMIT LIMITATIONS

CONTAMINANT	PERMISSIBLE CONCENTRATION
pH	$\leq 6.5 - \geq 9$
Five day BOD	45 mg/L over 7 day average
Total Suspended Solids	110 mg/L over a 7 day average
Oil and Grease	10 mg/L daily average

The sampling activities were conducted during the period 16-22 November 1995. Five stations within the sanitary sewer system, three O/W separators, one grease trap, and one background sampling location were selected to be sampled based on their locations relative to industrial facilities supporting Falcon AFB operations. These locations are summarized in Table 6.

TABLE 6
SAMPLING STATION DESCRIPTION

SITE	SOURCES OF WASTEWATER
Site F-1. FOTW Effluent	Manhole 54/55. Effluent from the FOTW prior to discharge into the infiltration ponds.
Site F-2. FOTW Influent	Manhole 2. Influent to the FOTW.
Site F-3. Space Warfare Center, Dining Hall	Manhole 9. Buildings 300 & 400 effluent contain the primary mission facilities of the Space Warfare Center, the command section, and the dining hall.
Site F-4. Buildings 500 & 600	Manhole 9. Buildings 500 & 600 effluent supports the support mission functions such as civil engineering, services, and emergency power production.
Site F-5. North Area	Manhole 10. This manhole receives waste from the base gymnasium and storm drainage from the north east parking lot and POL yard.
Site F-6. Fire Department	Fire Department oil water separator, building 715
Site F-7. Fill Stand	MOGAS Fill Stand oil water separator. North side of building 600.
Site F-8. Vehicle Washrack	Vehicle washrack oil water separator. South side of building 600
Sites F-9 & F-10. Dining Hall	Influent & Effluent to Dining Hall grease trap. Building 300

Sampling Methods

The survey team installed and programmed an autosampler to collect 24-hour time-proportioned composite samples at Sites 1-5. Wastewater samples were collected daily

for three days at Sites 1 through 5. Grab samples were collected from three O/W separators, a grease trap at the dining hall, and one potable water source which represents a background comparison sample. Table 7 lists the collection periods and the chemical analyses performed on the collected samples. Table B-1 of Appendix B, lists the USEPA Methods used to analyze the samples, holding times, and preservation methods.

TABLE 7
ANALYSES PERFORMED

LOCATION	ANALYTICAL REQUIREMENTS
Site F-1 FOTW Effluent **Sample Period**: 3 days Site F-2 FOTW Influent **Sample Period**: 3 days	**Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total glycols, EPA Method 615 Herbicides, pH, and Temperature.
Site F-3, F-4, F-5 Buildings 300, 400, 500, 600, and North Area **Sample Period**: 3 days	**Sample Type**: 24-Hour Composite **Sample Parameters**: EPA Method 200.7 Metal Screen, Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, pH, and Temperature.
Site F-6 Fire Department **Sample Period**: 1 day	**Sample Type**: Grab **Sample Parameters**: COD, O/G, TPH, Phenols, Surfactants - MBAs, pH, and Temperature.
Site F-7 Fill Stand **Sample Period**: 1 day	**Sample Type**: Grab **Sample Parameters**: EPA Methods 624 VOCs, COD, O/G, TPH, Ammonia, Kjeldahl Nitrogen (total), Phenols, Surfactants-MBAs, Total Glycols, pH, and Temperature.
Site F-8 Vehicle Washrack **Sample Period**: 1 day	**Sample Type**: Grab **Sample Parameters**: EPA Method 200.7 metal screen, COD, O/G, TPH, Phenols, Surfactants-MBAs, Glycols, pH, and Temperature.
Site F-9 & F-10 Dining Hall **Sample Period**: 1 day	**Sample Type**: Grab **Sample Parameters**: O/G, TPH, Phenols, Ammonia, Total Kjeldahl Nitrogen, Phenols, Total Residue, Filterable Residue, Nonfilterable Residue, Surfactants-MBAs, EPA Method 615 Pesticides, EPA Method 624 Volatile Organic Compounds, pH, and Temperature.

Wastewater characterization samples were collected at each of the five sites for a 24-hour period. The samples are time-proportional composite samples (i.e., a composite of 48 samples collected at 0.5 hour intervals). The automated composite samplers used during the survey contained a 3-gallon glass "pickle" jar. The pickle jar was packed in ice prior to each day of sampling. Wastewater pH and temperature were measured every day at each site during sample collection. Physical characteristics (odor, color, etc.) of the samples were also noted.

Grab samples were collected from the three O/W separators and the influent and effluent of the grease trap, and a potable water sample was collected in the dining hall at a sink used for food preparation. The potable water sample represents the quality of the source water feeding the wastewater system. The samples were preserved in accordance with AFOEHL sampling procedures, cooled, placed in iced coolers, and shipped via overnight package service (FEDEX) to AL/OEA at Brooks AFB.

Site Descriptions

Five sites, three O/W separators, and one grease trap located in the main cantonment area of Falcon AFB were selected as sampling stations. One potable water sample was also collected in the dining hall at a sink used for food preparation. The potable water sample represents a background sample indicating the water quality feeding the wastewater system. Sites were selected to determine (1) the source of contaminants present in the Falcon AFB sanitary sewer system and allow contributing operations to be identified, (2) determine the treatment effectiveness of the wastewater treatment plant, and (3) attempt to characterize the quality of effluent discharged from existing O/W separators and the grease traps.

Site F-1, Pond Effluent, Manhole #54/55

Samples obtained from Site F-1 were collected from the discharge point located in the southeastern sector of the base at the treatment plant. Samples collected at this location represent the quality of wastewater being discharged from Falcon AFB to the infiltration ponds. This location is indicative of the monitoring requirements established in Falcon's NPDES permit. Three 24-hour, time-proportional composite samples were collected at this site over a 3-day period (17, 18, and 21 November 1995).

Site F-2, Pond Influent, Manhole #2

Samples obtained from Site F-2 were collected from Manhole #2 located at the head works of the treatment plant. The sampler was setup after the grit chamber (bar screen). Wastewater samples collected from this location are representative of the activities throughout the Falcon and will provide a means of comparing the characteristics of the influent with the effluent and evaluating the effectiveness of the treatment operations undertaken. Two of the three 24-hour, time-proportional composite samples

were collected at this location (17, 18, and 21 November 1995). The sample from 17 November was not collected due to a malfunction with the auto sampler.

Site F-3, Building 300/400 Manhole #9

Samples obtained from Site F-3 were collected from Manhole #9 located immediately east of building 300, west of building 500, approximately 15 to 20 feet east of the sidewalk adjacent to Navstar Street and near a row of 30 foot tall trees. This manhole is a central location that many samples could be pulled from. Waste from the east, west, and north all combine here and flow south to the treatment plant. The western invert was sandbagged to create a minor backflow sufficient to place the sampling strainer into its unique flow from buildings 300 and 400. Building 400 is the facility primarily housing the Space Warfare Center, supporting the base's space tracking mission. Building 300 supports the dining hall and command support functions. Wastewater samples collected from this location are representative of activities of those shops described above. Three 24-hour, time-proportional composite samples were to be collected at this location over a 3-day period (17, 18, and 21 November 1995). On the last day of sampling, the autosampler malfunctioned and did not collect a sufficient sample, therefore, a grab sample was collected after correcting the malfunction. The significance of comparing a grab sample to a time weighted composite sample is that highly variable fluctuations in waste stream loading may not be represented. If the waste stream has non-routine processes or periodic strong waste discharges, the grab sample may not reflect that input at all.

Site F-4, Building 500/600, Manhole #9

Samples obtained from Site F-4 were collected from the same manhole as Site F-3, except that another sandbag was placed in the eastern invert to create a minor backflow sufficient to place the sampling strainer into its unique flow from buildings 500/600. Building 500 supports the civil engineering functions, information management, environmental flight, and some services functions. Building 600 hosts the emergency electrical generators, military MOGAS fill station, and power production (CE) shops. Wastewater samples collected from this location are representative of activities of those shops described above. Three 24-hour, time-proportional composite samples were collected at this location over a 3-day period (17, 18, and 21 November 1995).

Site F-5, North Area, Manhole #10

Samples obtained from Site F-5 were collected from Manhole # 10 located near the northwest corner of the intersection of O'Malley Avenue and Navstar Street, near the north perimeter fence on the southeastern side of the main parking lot. Facilities that discharge to this manhole include the base gymnasium, the POL yard, the entry control facility (building 200), and the storm effluent from the northeast parking lot. Wastewater samples collected from this location are representative of those activities described above.

Three 24-hour, time-proportional composite samples were collected at this location over a 3-day period (17, 18, and 21 November 1995).

Site F-6, Fire Department, O/W Separator

Grab samples were collected from the O/W separator located in the center of the southeast driveway of the new fire department facility. The fire chief stated, at the time of the survey, that maintenance activities were not being performed on the fire equipment or vehicles at this facility. The grab samples were collected from the effluent side of the separator on 21 November 1995.

Site F-7, Military Gas Station, North side Building 600

Grab samples were collected from the O/W separator located on the north side of building 600. The trench drains from the military gas station drain to this O/W separator as does the industrial wastewater from building 600. The grab samples were collected from the effluent side of the separator on 21 November 1995.

Site F-8, Vehicle Washrack, South side building 600

Grab samples were collected from the O/W separator located on the south side of building 600 at the vehicle washrack. The trench drain from the washrack drains to this oil water separator with the effluent going into the sanitary sewer. The washrack was taken off-line four days prior to sampling therefore, while not active, it was still operational and worthy of being sampled. The grab samples were collected from the effluent side of the separator on 21 November 1995.

Site F-9 & F-10, Grease Trap, Dining Hall

Two grab samples were obtained from the grease trap at the dining hall. A sample was taken from each side (influent/effluent) of the grease trap in order to evaluate the effectiveness of the structure. Site F-9 reflects the upstream side of the trap indicating the strength of the waste as it enters the trap. Site F-10 reflects the effluent side of the trap indicating the strength of the waste leaving the trap and entering the sanitary sewer system. The grab samples were collected from the grease trap on 21 November 1995.

Site 11, Potable Water Sample

A single grab sample of the water from the drinking water system was collected from the food preparation area in the dining hall. This sample will allow a baseline evaluations of the source water that provides input to the wastewater samples collected during the survey. The potable sample was collected on 21 November 95.

RESULTS

Typical characteristics of the individual constituents found in untreated domestic wastewater are reported in Table 2. Depending on the concentrations of these constituents, wastewater may be classified as strong, medium, or weak (4). These concentrations, along with the maximum permissible concentrations of wastewater discharged to the Falcon AFB FOTW, serve as standards by which the quality of Falcon AFB's wastewater may be determined. Also, analytical results of samples collected from the O/W separators indicates their contribution of pollutants to the sanitary sewer system. The analytical results from the wastewater samples collected during the course of the survey at Falcon AFB are summarized by location in the following section. The sampling sites are discussed individually and summary data tables are provided in Appendix F.

Site F-1, Base Discharge Point

Wastewater samples collected at Site F-1 are representative of the quality of wastewater that Falcon AFB discharges to the on-base treatment facility. Concentrations of contaminants detected in samples collected at Site F-1 are typical of a weak domestic wastewater. Appendix F-1 contains the results of samples collected at Site F-1 over the period 17-21 November 1995.

Although exhibiting weak characteristic strength, measurable amounts of various constituents are present in the wastewater at the base discharge point. Specific parameters of interest include low chemical oxygen demand (COD, 81 mg/L to 167 mg/L), Oil and Grease (O/G maximum concentration of 14.4mg/L), TPH (maximum concentration of 9.6 mg/L), phenols (maximum concentration of 37 μg/L), total residue (maximum concentration of 868 mg/L), filterable residue (TDS, maximum concentration of 885 mg/L), Ammonia 26.4 mg/L, Kjeldahl Nitrogen 32.5 mg/L, total glycols ranged from 145 to 568 mg/L. Effluent pH concentrations varied significantly from 6.8 to 10 units. Site F-1 did not have measurable concentrations of VOCs, TTHMs, or herbicides.

Site F-2, FOTW Influent, Manhole #2

Wastewater samples collected at Site F-2 characterize waste strength entering the Falcon AFB FOTW. Appendix F-2 contains the results of samples collected at Site F-2 over the period 18 and 21 November 1995. Concentrations of contaminants detected in samples collected at Site F-2 are typical of a weak domestic wastewater with the exception of being high in solids content. Two of the three 24-hour, time-proportional composite samples were collected at this location (17, 18, and 21 November 1995). The sample from 17 November was not collected due to a malfunction with the auto sampler.

Analytical results indicate that total residue (maximum concentration of 952 mg/L), filterable residue (TDS, maximum concentration of 1015 mg/L), and minor concentrations of COD 343 mg/l, O/G 35 mg/l, ammonia and Kjeldahl nitrogen below

50 mg/l, phenols 53 mg/l, and very low levels of three trihalomethanes (bromoform 4.3 µg/l, chlorodibromomethane 1.5 µg/l, 1,4-dichlorobenzene 4 µg/l). No detectable concentrations of herbicides were measured in either sample.

Site F-3, Building 300/400, Manhole #9

Wastewater samples from buildings 300 and 400 characterize concentrations of contaminants typical of a weak to moderate domestic wastewater. Analytical results reported in Appendix F-3 indicate that the only parameters which exceeded the characteristics of a typical weak domestic wastewater include COD at 265 - 465 mg/L, O/G 9.6 to 80 mg/L, Ammonia 11.2 to 26.8 mg/L, Total Kjeldahl Nitrogen 34-50 mg/L, and total residue 654 - 844 mg/L.

Site F-4, Buildings 500/600, Manhole #9

Wastewater samples collected at Site F-4 are typically representative of activities which occur in buildings 500 and 600. Appendix F-3 contains the results of samples collected at Site F-4 over the period 17-21 November 1995. Characterization results indicate that the waste from this area is rather high strength.

On 17 November 1995, the O/G was exceptionally high at 2175 mg/L and that a supporting result measured TPH at 768 mg/L. Residue results were rather high all three days of sampling, total residue ranged from 802 - 966 mg/L, and filterable residue 608 - 824 mg/L. The spike of the O/G may have been due to a slug of material being discharged to the sewer system. This sample site may have captured a slug of material being discharged to the sewer system from the operations in buildings 500 and 600. Such as civil engineering, services, or maintenance activities from the emergency generators in building 600.

Site F-5, North Area Manhole #10

Wastewater samples collected at Site F-5 are typically representative of activities which occur in the north parking area, the gym, the entry control facility, and the POL yard. Appendix F-3 contains the results of samples collected at Site F-5 over the period 17-21 November 1995. Concentrations of contaminants detected in samples collected at Site F-5 are typical of a weak to moderate domestic wastewater.

Analytical results from the North Area indicate that the residue and ammonia concentrations may warrant additional surveillance. COD, O/G, and TPH levels were low. While ammonia (16.4 - 56mg/L), TKN (19.5 - 49 mg/L), and residues (TDS; 356-448 mg/L, and Total Residue was 356 - 448 mg/L) were weak to moderate. Trace levels of TPH, various metals, TSS, and surfactants-MBAs also were detected in samples collected at Site F-5.

Site F-6, Fire Department O/W Separator, Building 715

Wastewater samples collected at Site F-6 represent the new fire station and the general lack of maintenance activities occurring at the fire department. This is consistent with the fire chief's description of activities at the facility. The only sample result of concern is the total glycol result of 437.1 mg/L. Appendix F-4 contains the results of samples collected at Site F-6 on 21 November 1995.

Site F-7, Gas Fill Stand, North of Building 600

Grab samples collected at Site F-7 represent the effluent of the O/W separator treating the wastewaters from the MOGAS fuel stand. The fill stand is sloped toward exterior trench drains which would capture any and all fuel spills and all storm event precipitation. The results of these samples indicate that the OWS may have a concern with glycols being present in the sample. This may be valid if the drain system serves more than just the fuel fill stand, such as an interior room of building 600. Appendix F-4 contains the results of samples collected at Site F-7 on 21 November 1995.

Site F-8, Vehicle Maintenance Washrack, South of Building 600

A grab wastewater sample was collected from the vehicle washrack south of building 600. The washrack was closed just prior to initiation of the survey but had not been drained or maintenanced since being closed for the winter season. Sample results indicate that the washrack was in proper working order and no elevated levels of common constituents were measured in the samples. Oil & Greases, TPH, surfactants, and glycol concentrations were very low or non-detected in the sample. Appendix F-4 contains the results of samples collected at Site F-8 on 21 November 1995.

Site F-9 & F-10, Dining Hall Grease Trap, Influent & Effluent

Wastewater samples were collected at Sites F-9 and F-10 to characterize the effectiveness of the grease trap used to separate typical dining wastes from food preparation operations at Falcon AFB. Falcon's main dining facility and kitchen has only one large grease trap to prevent large quantities of organic greases and oils from being delivered directly to Falcon's FOTW. Upon inspection, the trap did not appear to have been serviced recently and was very odoriferous! Food solids and large grease clumps were bypassing the separator and flowing to the FOTW. Concentrations of Oil and Grease were actually higher on the effluent side of the traps than the influent. No detectable presence of herbicides could be measured from either sample. Measurable concentrations of Limonene were detected in both influent and effluent samples (48 and 31 mg/L, respectively). The wastes from dining facilities are typically very high in strength and the grease traps require periodic (normally monthly) cleaning and maintenance. Appendix F-5 contains the results of samples collected at Site F-9 & F-10 on 21 November 1995.

Quality Assurance / Quality Control

Pitcher blanks and Potable Water Samples

The general trend of both of these samples indicate that proper technique was utilized in the field sampling operations. The potable water sample indicates that there may be background trihalomethanes (21.9 µg/L) in the source drinking water supplied to Falcon AFB. The maximum contaminant level for TTHMs in the Safe Drinking Water Act (SDWA) is reported as 100 µg/L. No pesticides were detected in either sample. The concentration of specific metals continued to be a problem with all the sample results at all three bases and is truly indicative of contamination of the preservative acid. Appendix F-6 contains the results of samples collected at Site F-11 on 21 November 1995.

CONCLUSIONS AND RECOMMENDATIONS

Metals

In addition to the six metals (aluminum, chromium, copper, iron, lead, and zinc) present from the suspected contamination of the nitric acid preservative; barium, manganese, molybdenum, and nickel were present in the potable water sample, and the samples collected at the wastewater treatment plant.

Barium

All metal samples collected at Falcon AFB contained minor concentrations of Barium. Barium was present in the samples collected from all sites where the analysis was requested.

Recommendation: Continue to monitor potable and wastewater streams for metals especially for barium with minor emphasis on manganese, molybdenum, and nickel. Ensure that reagent grade preservation acids are obtained from the analytical laboratory receiveing the samples and request internal QA/QC laboratory data for the metals analysis.

Total Trihalomethanes

Trihalomethanes were detected in the potable water sample and at the influent to the wastewater treatment plant. Due to the limited scope of Falcon's aspect of this survey, recommend that continued monitoring be performed for TTHMs on the potable water supply and the effluent to the evaporation ponds. If TTHM concentrations in the drinking water approach 100 µg/L, contact the Bioenvironmental Engineering Flight at Peterson AFB to assist in identifying whether the source is from the potable water supplier or if the chlorine added by the base is reacting with organic materials in the potable water.

According to Air Force Instruction (AFI) 32-1067, wastewaters from operations which produce hazardous wastes such as aircraft maintenance operations, are required to meet pretreatment standards before being discharged to the wastewater treatment plant, or the wastewater should be handled as hazardous waste (6). In addition, AFI 32-7041 indicates that oil/water separators must be inspected and maintained regularly to ensure water quality compliance (7). A review of the operation and maintenance procedures for the base's oil/water separators is recommended.

Falcon AFB does not have any heavy industrial operations. The majority of the industrial functions common to the base could best be characterized as administrative and light electronic repair. Base operations, including civil engineering functions, could also be classified as very light general maintenance operations. And since Falcon is a high security facility, there are no residential facilities to support on base. Therefore, the wastewater treatment facility appears to be operating effectively for Falcon AFB. During the survey the south half ("B train") of the process train was inactive and the aeration units were under repair. Continued effluent monitoring may demonstrate that Falcon AFB does not have significant problems meeting its NPDES permit limitations. The vast majority of the base populace resides near Colorado Springs or on Peterson AFB, CO.

The results discussed in this report reflect the quality of the wastewater during the period of this survey. Any changes that may have occurred to operations, shop practices, chemical usage, base population, or mission since the completion of this survey will change the nature of future discharges into the sanitary sewer collection system and Falcon AFB's FOTW.

CHEYENNE MOUNTAIN AIR FORCE BASE

INTRODUCTION

Cheyenne Mountain AFB discharges its wastewater effluent to Fort Carson. Wastewater samples from three sites, two industrial processes, and two background water sources within the base cantonment area were collected and analyzed for various pollutant parameters. The goals of the survey were to (1) collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified, and (2) determine the quality of wastewater that is discharged to Fort Carson FOTW.

Background

Cheyenne Mountain AFB is located approximately seven miles southwest of Colorado Springs, Colorado and is immediately west of Fort Carson. Cheyenne Mountain supports the U.S. Space Command and NORAD mission requirements through the Cheyenne Mountain Operations Center. The Cheyenne Mountain Operations Center provides the central hub of space surveillance activities, monitoring all space based platforms from ballistic missile launches to collision avoidance of unknown space debris.

Cheyenne Mountain AFB industrial activities are best described as light. These facilities include, but are not limited to: vehicle washracks, motor vehicle maintenance, general engineering maintenance, electronic maintenance and repair, and other mission support maintenance.

The existing wastewater facilities at Cheyenne Mountain incorporate O/W separators and a separate collection system for infiltration water from within the mountain. The sanitary sewer also receives industrial wastewater from various facilities throughout the interior complex and the rest of the base. This wastewater is ultimately discharged to a wastewater treatment plant located immediately down the mountain on Fort Carson. Fort Carson maintains and operates a wastewater treatment plant, FOTW.

Sampling Strategy

Captain Jeffrey Gillen and Captain Christopher Williston conducted a wastewater characterization presurvey at Cheyenne Mountain AFB on 10-13 October 1995. During this presurvey, a sampling strategy was developed with the assistance of Major Daniel Turek, Captain Jay Vietas, and Captain Wendy Klein, Bioenvironmental Engineering, Peterson AFB, and Lt Ted Munchmeyer, environmental flight, Civil Engineering, Cheyenne Mountain. The goals of the sampling plan were to: (1) collect wastewater samples from locations throughout the base which would accurately characterize the base

sewage and allow contributing operations to be identified, and (2) determine the quality of wastewater that is discharged to the Fort Carson FOTW.

The sampling activities were to be conducted during the period 16-22 November 1995. Three stations within the sanitary sewer system, two industrial grab samples, and two background sampling location were selected for sampling based on their locations relative to industrial facilities and major contributing operations supporting Cheyenne Mountain AFB operations. These locations are summarized in Table 8.

Sampling Methods

The survey team installed and programmed autosamplers to collect 24-hour time-proportioned composite samples. Composite wastewater samples were collected daily for 3 days at Sites 1 through 3. Grab samples were collected from two industrial areas and two water sources which represent background comparison samples. Table CM-1 also lists the collection periods and the chemical analyses performed on the collected samples. Table B-1 of Appendix B, lists the USEPA Methods that were used to analyze the samples, holding times, and preservation methods.

Samples collected during the survey were analyzed in accordance with AFOEHL technical report, *Recommended Sampling Procedures* (2). These procedures generally follow guidelines established by the USEPA.

Composite Samples

Wastewater characterization composite samples were collected at each of the three sites for three days for a 24-hour period. The samples were time-proportioned composite samples (i.e., a composite of 48 samples collected at 0.5 hour intervals). The automated composite samplers used during the survey contained a 3-gallon glass "pickle" jar to hold the composite sample. The pickle jar was packed in ice prior to each day of sampling. Wastewater pH and temperature were measured every day at each site during sample collection. Physical characteristics (odor, color, etc.) of the samples were also noted.

At the completion of the 24-hour sampling period, representative samples were transferred from the pickle jar to appropriate sample containers. The samples were preserved in accordance with AFOEHL sampling procedures, cooled, placed in iced coolers, and shipped by overnight package service to AL/OEA at Brooks AFB.

Grab Samples

Grab samples were collected from two locations and from two potable water sources. Similarly, sufficient sample was collected in 3-gallon glass "pickle" jars. Wastewater pH and temperature were measured every day at each site during sample collection. Physical characteristics (odor, color, etc.) of the samples were also noted.

The samples were preserved in accordance with AFOEHL sampling procedures, cooled, placed in iced coolers, and shipped via overnight package service (FedEx) to AL/OEA at Brooks AFB.

Site Descriptions

Five sampling sites located in the main cantonment area of Cheyenne Mountain AFB were selected as sampling stations. Three of the five locations were candidates for time-weighted composite samples and the remaining two were suitable for grab samples. Two potable water samples were also collected. The potable water samples represent background information of the quality of the water feeding the wastewater system. Sites were selected to (1) determine collect wastewater samples from locations around the base which would accurately characterize the base sewage and allow contributing operations to be identified, (2) determine the quality of wastewater that is discharged to Fort Carson's FOTW.

Site CM-1, Cheyenne Mountain Combined Effluent

Samples obtained from Site CM-1 were collected from the main sewer line, manhole 17, which discharges Cheyenne Mountain's effluent to Fort Carson's wastewater collection system. Samples collected at this location represent the quality of wastewater being discharged from Cheyenne Mountain to the Fort Carson's FOTW. This location should be able to provide the necessary characterization information pertaining to the strength of Cheyenne Mountains wastewater effluent and the load that it applies to the FOTW. Three 24-hour, time-proportional composite samples were collected at this site over a 3-day period (17, 18, and 21 November 1995).

Site CM-2, Industrial Waste Line

Samples obtained from Site CM-2 were collected internal to the mountain complex at the industrial waste sumps (sump 48/49). Wastewater samples collected from this location are representative of the internal industrial activities internal to the Cheyenne Mountain complex. Three 24-hour, time-proportional composite samples were collected at this site over a 3-day period (17, 18, and 21 November 1995).

Site CM-3, Sanitary Line

Samples obtained from Site CM-3 were collected from Manhole #41, located approximately 30 feet from the southeast corner of the Support Group Headquarters, building 101. The sanitary line represents the effluent loads primarily comprised of domestic waste (human waste and food preparation). Three 24-hour, time-proportional composite samples were to be collected at this location over a 3-day period (17, 18, and 21 November 1995).

Site CM-4, Storm Drain

The grab sample obtained from Site CM-4 was collected from Manhole #33.11 located across the road from the vehicle high security entrance gate. The effluent in this waste stream is generated from the excess infiltration water that seeps through the fissures within the geologic formations of the mountain. The pre-survey identified this location for multiple day composite sampling, but after discussion with local base utilities maintenance personnel, this sampling location was downgraded to a single grab sample. This waste stream effluent profile was reported to be stable and that no other contributions make-up this effluent. Therefore, this sample was analyzed for potable safe drinking water act requirements and the unique requirements identified for the other sampling locations. The storm drain effluent combines with the sanitary sewage from the industrial waste line (CM-2) and the sanitary line (CM-3) further downstream.

Site CM-5, Vehicle Maintenance and Civil Engineering Operations and Maintenance

The grab sample obtained from Site CM-5 was collected from Manhole #32.1. This waste stream captures the effluent from the civil engineering operations and maintenance complex and the main gate. Due to low flow conditions during the survey only one composite sample over a 3-day period could be collected.

Site CM-6 Industrial Water and CM-7 Domestic Water

Samples obtained from Site CM-6 and CM-7 were collected from the industrial and domestic water reservoirs. These samples represent the background water quality of the water supplying the wastewater collection system. A single sample was collected from each reservoir system.

TABLE 8
SAMPLING LOCATION DESCRIPTION

SITE	SOURCES OF WASTEWATER	ANALYTICAL REQUIREMENTS
Site CM-1: Cheyenne Mountain Effluent **Sample Period:** 3 days (17, 18, & 21 Nov 95)	**Manhole #17:** Combined effluent from Cheyenne Mountain (CM) prior to entering the wastewater collection system at Fort Carson	**Sample Type:** 24-Hour Composite **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, pH and temperature.
Site CM-2: Industrial Waste Line **Sample Period:** 3 days (17, 18, & 21 Nov 95)	**Sump #48/49:** Sample collected internal to the mountain complex at the industrial wastewater sumps	**Sample Type:** 24-Hour Composite **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, pH and temperature.
Site CM-3: Sanitary Line **Sample Period:** 3 days (17, 18, & 21 Nov 95)	**Manhole #41:** Domestic Sanitary Effluent from internal of the mountain complex, and Support Group Headquarters. Manhole located 30 feet southeast of Support Group Headquarters facility	**Sample Type:** 24-Hour Composite **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, pH and temperature.
Site CM-4: Storm Drain **Sample Period:** 1 day (16 Nov 95)	**Manhole #33.11:** Grab sample. Internal infiltration effluent from the mountain complex. Manhole located adjacent to the heigh security vehicle entrance gate.	**Sample Type:** Grab **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, pH and temperature.

TABLE 8; CONTINUED
SAMPLING LOCATION DESCRIPTION

SITE	SOURCES OF WASTEWATER	ANALYTICAL REQUIREMENTS
Site CM-5: Vehicle Maintenance and Civil Engineering Operations and Maintenance **Sample Period:** 1; 3 day composite sample (21 Nov 95)	**Manhole #32:** Sampling location down gradient from Main Gate. This waste stream captures the effluent from the civil engineering operations and maintenance complex, and the main gate.	**Sample Type:** Grab **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, pH and temperature.
Site CM-6: Industrial Water Reservoir **Sample Period:** 1 day (20 Nov 95)	Background water sample collected from the industrial water supply reservoir internal to the mountain	**Sample Type:** Grab **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, EPA Method 502.2 Total Trihalomethanes, pH and temperature.
Site CM-7: Domestic Water Reservoir **Sample Period:** 1 day (20 Nov 95)	Background potable water sample collected from the domestic (municipal) water supply reservoir internal to the mountain	**Sample Type:** Grab **Sample Parameters:** EPA Method 200.7 Metal Screen, EPA Methods 601/602 Volatile Organic Compounds (VOCs), Chemical Oxygen Demand (COD), Oil and Grease (O/G), Total Petroleum Hydrocarbon (TPH), Ammonia, Total Kjeldahl Nitrogen, Total Cyanide, Phenols, Total Residue, Filterable Residue (TDS), Nonfilterable Residue (TSS), Surfactants-MBAs, Total Glycols, EPA Method 502.2 Total Trihalomethanes, pH and temperature.

RESULTS

The analytical results from the wastewater samples collected during the course of the survey at Cheyenne Mountain AFB are summarized by location in the following section. Typical characteristics of the individual constituents found in untreated domestic wastewater are reported in Table 2. Depending on the concentrations of these

constituents, wastewater may be classified as strong, medium, or weak (4). These concentrations, along with the maximum permissible concentrations of wastewater discharged from Cheyenne Mountain AFB to the Fort Carson FOTW, serve as standards by which the quality of Cheyenne Mountain AFB's wastewater need to be assessed. The analytical results summarized in appendix E indicate that low concentrations of various constituents were present in the wastewater. Six metals (aluminum, chromium, copper, iron, lead, and zinc) present in the samples are believed to be attributable to preservative contamination. The sampling sites are discussed individually and summary data tables are provided in Appendix E.

Site CM-1, Cheyenne Mountain Combined Effluent

Composite wastewater samples collected at Site CM-1 represent the quality of the waste discharged from Cheyenne Mountain to Fort Carson FOTW. Table E-1 summarizes the analytical results from the samples over the period 17-21 November 1995. In general the waste stream effluent is typical of a weak domestic wastewater. Weak concentrations for Chemical Oxygen Demand, Oil and Grease, Total Petroleum Hydrocarbons, ammonia compounds, phenols, residue (solids), VOC's were observed. Glycol measurements for two samples were below the detection limit of 50 µg/L and one sample was measured at 361.25 µg/L.

Analytical results summarized in Table E-1 indicate that low concentrations of various constituents were also present in the wastewater. Six metals (aluminum, chromium, copper, iron, lead, and zinc) present in the samples are believed to be attributable to preservative contamination. The minor presence of molybdenum, nickel, and barium were also detected at low concentrations but were not uniformly observed during the course of the survey.

Site CM-2, Industrial Waste Line

Composite samples obtained from site CM-2 were collected internal to the mountain complex at the industrial waste sumps 48 and 49. Wastewater samples collected from this location (see figure 1) represent the light industrial activities interior to the Cheyenne Mountain complex. Samples were collected on 18 and 21 November 1995. Weak concentrations for COD, Oil and Grease, Total Petroleum Hydrocarbons, ammonia compounds, phenols, residue (solids), VOC's were observed. Glycol measurements for one sample were non-detect and the other sample recorded 591.97 µg/L.

Site CM-3, Sanitary Line

Samples from Manhole #41 represent normal sanitary waste loadings from the interior of the mountain complex and the support group headquarters (see figure 1). Over a 3-day period (17, 18, and 21 November 1995) the sample results indicate that characteristic loading of this waste stream is of medium strength and is the primary

component of the effluent from Cheyenne Mountain. The sanitary line primarily serves the chow hall and the lavatory facilities within the complex and the waste loading are typical of human waste and food preparation waste streams.

Concentrations for Oil and Grease, Total Petroleum Hydrocarbons, metals, residue (solids), VOC's exhibited weak strength. Moderate to high strength concentrations for COD, ammonia compounds, phenols, residue (solids), VOC's were observed. Glycol measurements ranged from 447 to 683 µg/L. Mercury concentrations were measured above the 0.002 mg/L detection limit at 0.005 to 0.007 mg/L.

Site CM-4, Storm Drain

The single grab sample obtained from Site CM-4 was collected from Manhole #33.11 (see figure 1). This waste stream exhibits very weak concentrations of the targeted compounds with a few exceptions. On 16 November 1995, the total petroleum hydrocarbons was the highest of any of Cheyenne Mountains TPH samples (320 mg/L). Weak concentrations for OD, TPH, ammonia compounds, phenols, residue (solids), VOC's. Glycol was measured at 916.76 µg/L.

Base plumbing officials indicated that the storm drain receives its flow from the various geologic infiltration sources within the mountain complex and that this waste stream effluent profile was reported to be stable and that no other contributions make-up this effluent. The TPH and VOC results indicate that an illicit interior connection exists on the storm line. The impact of this connection is minimal since the storm drain line and the other effluent lines co-mingle prior to discharging from the base. It is important to note that if the storm drain is ever completely isolated from the other waste streams for direct natural discharge, additional monitoring is recommended to validate if and where and illicit connection may exist.

Site CM-5, Vehicle Maintenance and Civil Engineering Operations and Maintenance

The one composite sample obtained from Site CM-5 was collected over a 3-day period from 17-21 November 1995. The analytical results indicate that this waste stream exhibits very weak concentrations (at the detection limits or below) of the targeted compounds. Based on the extremely low flow volumes observed during the survey the total combined impact from these shops on the overall wastewater discharged from CM should have no significant impact. Base environmental and shop personnel indicated that minimum operations are conducted in these shops. Major vehicle maintenance activities are contracted out and conducted off base in Colorado Springs or Peterson AFB.

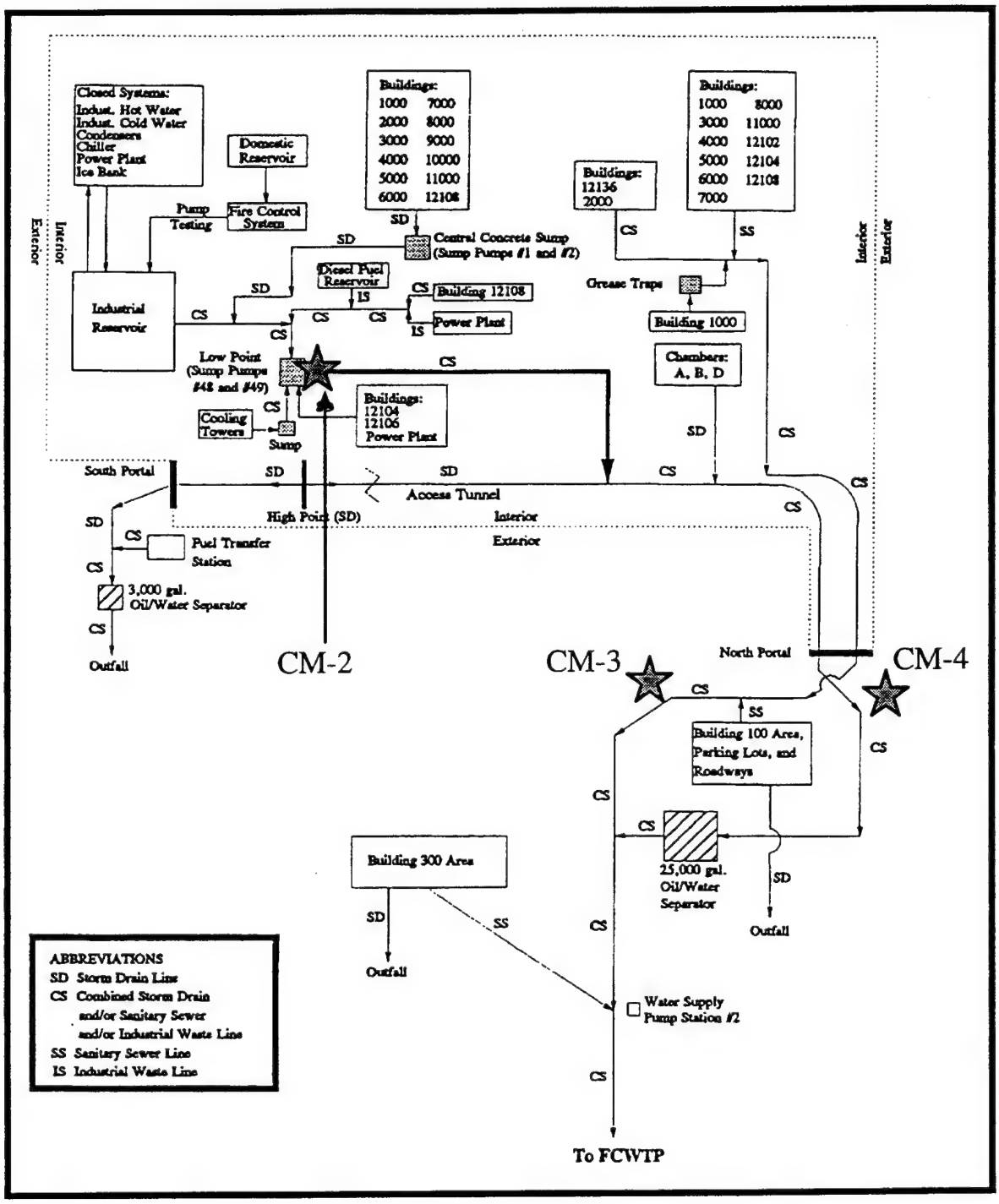

Figure 1
Cheyenne Mountain AFB Sampling Diagram
(CMAFB, Dec 1993)

Site CM-6 Industrial Water and CM-7 Domestic Water

The grab samples obtained from Site CM-6 and CM-7 were collected from the industrial and domestic water reservoirs. The industrial reservoir (CM-6) exhibited water quality characteristics consistent with a good potable water system. TTHM concentrations were non-detectable indicating that organic contaminants are not present from the predominately infiltration groundwater source. Measurable concentrations of ammonia compounds (free ammonia 24.0 mg/L and total Kjeldahl 32.5 mg/L) are of moderate strength. One analyte of concern is the presence of 5.4 µg/L trichloroethylene which is above the 5.0 µg/L maximum contaminant level for this compound. A related compound, cis -1,2-Dichloroethene was also measured at a concentration of 8.3µg/L.

Recommend checking other historical drinking water sample results for trichlorethene and ammonia compounds to further determine whether there is a latent problem with the source water or an anomalous result with this one sample result. The two VOC compounds are known laboratory chemicals and may have cross contaminated the sample. Internal quality assurance/quality control data was reviewed on all sample results for this survey and no anomalies or problems were encountered.

The water sample from the domestic reservoir (CM-7) indicates the presence of trihalomethanes (65.6 µg/L) in the source drinking water supplied to Cheyenne Mountain AFB. The maximum contaminant level for TTHMs in the Safe Drinking Water Act (SDWA) is reported as 100 µg/L. All other analytical parameter concentrations reported were not significant or at the non-detectable level. No pesticides were detected in either of the reservoir samples.

Quality Assurance / Quality Control; Pitcher blanks and Background Water Samples

The general trend of the QA/QC samples indicate that proper technique was utilized during field sampling operations. The concentration of specific metals continued to be a problem with all the sample results at all three bases and is truly indicative of contamination of the preservative acid.

CONCLUSIONS AND RECOMMENDATIONS

Armstrong Laboratory Occupational and Environmental Health Directorate personnel stationed at Brooks Air Force Base (AFB), TX conducted a wastewater characterization survey at Cheyenne Mountain AFB from 16-22 November 1995. The wastewater effluent quality being generated on Cheyenne Mountain AFB is typical of a very light industrial source. The industrial and military operations support Cheyenne Mountains space surveillance and tracking mission. Electronic and electrical maintenance activities are its primary industrial wastewater generating sources with contributing generators being normal dining hall food preparation activities and normal human waste loads. The large amount of storm/infiltration effluent further dilutes the strength of wastewater effluent being received by Fort Carson and its wastewater

treatment facility. Based on the findings presented here and the results obtained from the sampling activities during this survey, Cheyenne Mountain should have no significant impact on the Fort Carson treatment plant or the receiving waters of the state of Colorado. If supplemental sampling data from Fort Carson further indicates that Cheyenne Mountain AFB may be causing non-compliance conditions with its NPDES permit, recommend flow measurement and contaminant mass balance calculations be incorporated in subsequent monitoring efforts.

In summary, minor concentrations of the following compounds were measured during the survey and may require additional attention during routine or special sampling operations.

Metals

In addition to the six metals (aluminum, chromium, copper, iron, lead, and zinc) present from the suspected contamination of the nitric acid preservative; barium, mercury, and molybdenum were also consistently detected.

Barium

All the waste streams from Cheyenne Mountain AFB, with the exception of the industrial waste line (CM-2) and the industrial reservior (CM-6), contained minor concentrations of Barium. The observed concentrations were very low, near the detection limit of 0.05 mg/L.

Molybdenum

Site 2 and 4 indicated significant concentrations of molybdenum resulting in measurable concentrations at Site 1. The source waters and the grab sample from the CE vehicle maintenance areas did not detect molybdenum in their waste streams. Molybdenum may be an indicator of metals from the electrical/electronic components within CM.

Mercury

The sanitary line (CM-3) was the only sampling location which indicated the presence of Mercury for the entire duration of the survey. Recommend checking maintenance activities which may utilize barometers and magnehelic gauges be further investigated to determine the source of the mercury. The mercury source may be from a historical spill or barometer break that currently assigned personnel were not made aware. Therefore, it is possible that the mercury is located in the trap of a sink or floor drain connected to the sanitary line.

Recommendation: Continue to monitor potable and wastewater streams for metals especially for barium and molybdenum. Ensure that reagent grade preservation

acids are obtained from the analytical laboratory receiving the samples and request internal QA/QC laboratory data for the metals analysis.

Glycols

Glycol concentrations observed at Cheyenne Mountain were consistent with glycol concentrations observed in the quality assurance / quality control and the samples from both Falcon and Peterson AFB's during this survey.

Total Trihalomethanes

Trihalomethanes were detected in the potable water sample and at the influent to the wastewater treatment plant. Due to the limited scope of Cheyenne Mountain's aspect of this survey, recommend that continued monitoring be performed for TTHMs on the potable water supply and the effluent to the Fort Carson FOTW. If TTHM concentrations in the drinking water approach 100 μg/L, contact the Bioenvironmental Engineering Flight at Peterson AFB to assist in identifying whether the source is from the potable water supplier or if the base's chlorination unit is reacting with organic materials in the potable water.

According to Air Force Instruction (AFI) 32-1067, wastewaters from operations which produce hazardous wastes such as aircraft maintenance operations, are required to meet pretreatment standards before being discharged to the wastewater treatment plant, or the wastewater should be handled as hazardous waste (6). In addition, AFI 32-7041 indicates that oil/water separators must be inspected and maintained regularly to ensure water quality compliance (7). A review of the operation and maintenance procedures for the base's oil/water separators is recommended.

The results discussed in this report reflect the quality of the wastewater during the period of this survey. Any changes that may have occurred to operations, shop practices, chemical usage, base population, or mission since the completion of this survey will change the nature of future discharges into the sanitary sewer collection system subsequent discharge to Fort Carson's FOTW.

REFERENCES

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6. United States Air Force, Air Force Instruction 32-1067, *Wastewater Management*. Secretary of the Air Force: March 1996.

7. United States Air Force, Air Force Instruction 32-7041, *Water Quality Compliance*. Secretary of the Air Force: May 1994.

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APPENDIX A

DEPARTMENT OF THE AIR FORCE

21ST SPACE WING (AFSPC)

14 Sept 1995

MEMORANDUM FOR: Armstrong Laboratory/OEB

FROM: 21 AMDS/SGPB
625 W Ent Ave
Peterson AFB CO 80914-2840

Subject: Request for Wastewater Characterization Surveys

1. 21 AMDS Bioenvironmental Engineering Services is requesting a complete wastewater characterization survey of Peterson AFB, Falcon AFB and Cheyenne Mountain Air Station, all located in Colorado Springs CO. Funds will be provided to Armstrong Laboratory by 21 AMDS/SGPB via AF Form 185 for these surveys.

2. The survey is requested for the first quarter FY 1996, (Oct-Dec 95) timeframe. The following components are requested to be included in the survey:

a. Complete wastewater characterization of base effluent from Peterson AFB; effluent goes to Colorado Springs POTW. Sampling of nineteen oil-water separators is also requested.

b. Complete wastewater characterization of base effluent from Cheyenne Mountain AS; effluent goes to Fort Carson Army base FOTW. Three oil-water separators also need to be sampled.

c. Complete wastewater characterization of base effluent from Falcon AFB, Falcon treats its own sewage, effluent discharges into on-site rapid infiltration beds. Falcon AFB has seven oil-water separators that need to be sampled/characterized.

3. We have been in contact with Capt Jeff Gillan of your water quality branch; we have tentatively scheduled a pre-survey visit and project kick-off meeting here the week of 10-13 October 1995. Please let me know as soon as possible if you can support this request and the projected dates for the pre-survey. Direct any questions regarding this request to me at DSN 834-7721, Fax: 8370.

Daniel R Turek

DANIEL R. TUREK, Maj, USAF, BSC
Director, Bioenvironmental Engineering

cc: 21 CES/CEV
50 CES/CEV
721 CES/CEV

APPENDIX B

WASTEWATER ANALYTICAL AND PRESERVATION METHODS

PARAMETER	EPA METHOD	PRESERVATION	HOLDING TIME (days)
Aluminum	200.7	HNO_3	180
Antimony	200.7	HNO_3	180
Arsenic	200.7	HNO_3	180
Barium	200.7	HNO_3	180
Beryllium	200.7	HNO_3	180
Cadmium	200.7	HNO_3	180
Chromium (Total)	200.7	HNO_3	180
Cobalt	200.7	HNO_3	180
Copper	200.7	HNO_3	180
Iron	200.7	HNO_3	180
Lead	200.7	HNO_3	180
Manganese	200.7	HNO_3	180
Mercury	200.7	HNO_3	180
Molybdenum	200.7	HNO_3	180
Nickel	200.7	HNO_3	180
Selenium	200.7	HNO_3	180
Silver	200.7	HNO_3	180
Thallium	200.7	HNO_3	180
Titanium	200.7	HNO_3	180
Vanadium	200.7	HNO_3	180
Zinc	200.7	HNO_3	180
Cyanide	335.3	NaOH	14
Chemical Oxygen Demand (COD)	410.4	H_2SO_4,4°C	28
Phenols	420.2	H_2SO_4,4°C	28
Oil and Grease	413	H_2SO_4,4°C	28

PARAMETER	EPA METHOD	PRESERVATION	HOLDING TIME (days)
Total Petroleum Hydrocarbons (TPH)	418.1	H_2SO_4,4°C	28
Total Toxic Organics	625	4°C	7
Residue, Total	160.3	None	28
Residue, Filterable	160.1	None	28
Residue, Nonfilterable	160.2	None	28
Surfactants-MBAs	425.1	4°C	2
Purgeable Halocarbons	602	4°C	14
Purgeable Aromatic Volatiles	601	4°C	14
Base/Neutral Acids	625	4°C	14
Herbicides	615	4°C	14
Total Glycols	NYAPC-44	4°C	n/a

APPENDIX C

TABLE C-1: EQUIPMENT BLANK SAMPLE ANALYTICAL RESULTS
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		EQUIPMENT BLANK 1	EQUIPMENT BLANK 2			EQUIPMENT BLANK 1
	UNITS	20-Nov-95	21-Nov-95	VOLATILE ORGANIC	UNITS	20-Nov-95
GROUP A & B ANALYTES		Monday	Tuesday	COMPOUNDS		Monday
Chemical Oxygen Demand	mg/L	<10	19	Benzene	µg/L	<1.0
Oil and Grease	mg/L	1.40	NRA*	Benzyl Chloride	µg/L	<1.0
Total Petroleum Hydrocarbon	mg/L	1.10	NRA*	Bromobenzene	µg/L	<1.0
				Bromodichloromethane	µg/L	1.0
Group C Analytes				Bromoform	µg/L	<1.0
Ammonia	mg/L	<0.2	<0.2	Bromomethane	µg/L	<1.0
Kjeldahl Nitrogen (Total)	mg/L	0.4	0.2	Carbon tetrachloride	µg/L	<1.0
				Chlorobenzene	µg/L	<1.0
GROUP D ANALYTES				Chlorodibromomethane	µg/L	<1.0
Cyanide (Total)	mg/L	<0.005	<0.005	Chloroethane	µg/L	<1.0
				Chloroform	µg/L	21.5
GROUP E ANALYTES				2-Chlorethylvinyl Ether	µg/L	<1.0
Phenols	µg/L	<10	<10	Chloromethane	µg/L	<1.0
				Chlorodibromomethane	µg/L	<1.0
GROUP F ANALYTES				Dibromomethane	µg/L	<1.0
Aluminum	mg/L	<0.030	<0.030	1,2-Dichlorobenzene	µg/L	<1.0
Antimony	mg/L	<0.005	<0.003	1,3-Dichlorobenzene	µg/L	<1.0
Arsenic	mg/L	<0.005	<0.005	1,4-Dichlorobenzene	µg/L	<1.0
Barium	mg/L	<0.05	<0.050	Dichlorodifluoromethane	µg/L	<1.0
Beryllium	mg/L	<0.001	<0.001	1,1-Dichloroethane	µg/L	<1.0
Cadmium	mg/L	<0.001	<0.001	1,2-Dichloroethane	µg/L	<1.0
Total Chromium	mg/L	<0.010	0.058	1,1-Dichloroethene	µg/L	<1.0
Cobalt	mg/L	<0.05	<0.050	Trans-1,2-Dichloroethene	µg/L	<1.0
Copper	mg/L	<0.010	0.041	1,2-Dichloroethene	µg/L	<1.0
Iron	mg/L	<0.030	0.276	1,2-Dichloropropane	µg/L	<1.0
Lead	mg/L	<0.005	0.007	Cis-1,3-Dichloropropene	µg/L	<1.0
Manganese	mg/L	<0.030	<0.030	Trans-1,3-Dichloropropene	µg/L	<1.0
Mercury	mg/L	<0.0002	<0.0002	Ethyl Benzene	µg/L	<1.0
Molybdenum	mg/L	<0.030	<0.030	Methylene Chloride	µg/L	<1.0
Nickel	mg/L	<0.030	0.045	1,1,1,2-Tetrachloroethane	µg/L	<1.0
Selenium	mg/L	<0.005	<0.005	1,1,2,2-Tetrachloroethane	µg/L	<1.0
Silver	mg/L	<0.010	<0.010	Tetrachloroethylene	µg/L	<1.0
Thallium	mg/L	<0.001	<0.0001	Toluene	µg/L	<1.0
Titanium	mg/L	<0.050	<0.050	1,1,1-Trichloroethane	µg/L	<1.0
Vanadium	mg/L	<0.050	<0.050	1,1,2-Trichloroethane	µg/L	<1.0
Zinc	mg/L	<0.050	0.078	Trichloroethylene	mg/L	<1.0
GROUP G				Trichlorofluoromethane	µg/L	<1.0
Residue Total	mg/L	19	NRA*	1,2,3-Trichloropropane	µg/L	<1.0
Residue , Filterable (TDS)	mg/L	17	NRA	Vinyl Chloride	µg/L	<1.0
Residue, Nonfilterable (TSS)	mg/L	<0.1	NRA	o-Xylene	µg/L	<1.0
Surfactants-MBAs	mg/L	<0.1	NRA	m-Xylene	µg/L	<1.0
HERBICIDES						
2,4-D	µg/L	<1.2	NRA			
2,4-DB	µg/L	<0.91	NRA			
Dalapon	µg/L	<5.8	NRA			
Dicamba	µg/L	<0.27	NRA			
Dichloroprop	µg/L	<0.65	NRA			
Dinoseb	µg/L	<0.07	NRA			
MCPA	µg/L	<249	NRA			
MCPP	µg/L	<192	NRA			
Silvex	µg/L	<0.17	NRA			
2,4,5-T	µg/L	<0.20	NRA			
EPA METHOD NYAPC-44						
Glycols (Total)	µg/L	55.27	<50			

TABLE C-2: REAGENT AND TRIP BLANK SAMPLE ANALYTICAL RESULTS
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		REAGENT BLANK			REAGENT BLANK	TRIP BLANK
		16-Nov-95			16-Nov-95	17-Nov-95
	UNITS	Thursday		UNITS	Thursday	Friday
GROUP A & B ANALYTES			**VOLATILE ORGANIC COMPOUNDS**			
Chemical Oxygen Demand	mg/L	<10	Benzene	µg/L	<1.0	<1.0
Oil and Grease	mg/L	1.40	Benzyl Chloride	µg/L	<1.0	<1.0
Total Petroleum Hydrocarbon	mg/L	1.20	Bromobenzene	µg/L	<1.0	<1.0
			Bromodichloromethane	µg/L	<1.0	<1.0
GROUP C ANALYTES			Bromoform	µg/L	<1.0	<1.0
Ammonia	mg/L	<0.2	Bromomethane	µg/L	<1.0	<1.0
Kjeldahl Nitrogen (Total)	mg/L	0.30	Carbon tetrachloride	µg/L	<1.0	<1.0
			Chlorobenzene	µg/L	<1.0	<1.0
GROUP D ANALYTES			Chlorodibromomethane	µg/L	<1.0	<1.0
Cyanide (Total)	mg/L	<0.005	Chloroethane	µg/L	<1.0	<1.0
			Chloroform	µg/L	15.20	14.70
GROUP E ANALYTES			2-Chlorethylvinyl Ether	µg/L	<1.0	<1.0
Phenols	µg/L	<10	Chloromethane	µg/L	<1.0	<1.0
			Chlorodibromomethane	µg/L	<1.0	<1.0
GROUP F ANALYTES			Dibromomethane	µg/L	<1.0	<1.0
Aluminum	mg/L	<0.030	1,2-Dichlorobenzene	µg/L	<1.0	<1.0
Antimony	mg/L	<0.003	1,3-Dichlorobenzene	µg/L	<1.0	<1.0
Arsenic	mg/L	<0.005	1,4-Dichlorobenzene	µg/L	<1.0	<1.0
Barium	mg/L	<0.050	Dichlorodifluoromethane	µg/L	<1.0	<1.0
Beryllium	mg/L	<0.001	1,1-Dichloroethane	µg/L	<1.0	<1.0
Cadmium	mg/L	<0.001	1,2-Dichloroethane	µg/L	<1.0	<1.0
Total Chromium	mg/L	0.03	1,1-Dichloroethene	µg/L	<1.0	<1.0
Cobalt	mg/L	<0.050	Trans-1,2-Dichloroethene	µg/L	<1.0	<1.0
Copper	mg/L	0.04	1,2-Dichloroethene	µg/L	<1.0	<1.0
Iron	mg/L	0.11	1,2-Dichloropropane	µg/L	<1.0	<1.0
Lead	mg/L	0.01	Cis-1,3-Dichloropropene	µg/L	<1.0	<1.0
Manganese	mg/L	<0.030	Trans-1,3-Dichloropropene	µg/L	<1.0	<1.0
Mercury	mg/L	<0.0002	Ethyl Benzene	µg/L	<1.0	<1.0
Molybdenum	mg/L	<0.030	Methylene Chloride	µg/L	<1.0	<1.0
Nickel	mg/L	<0.030	1,1,1,2-Tetrachloroethane	µg/L	<1.0	<1.0
Selenium	mg/L	<0.005	1,1,2,2-Tetrachloroethane	µg/L	1.00	<1.0
Silver	mg/L	<0.010	Tetrachloroethylene	µg/L	<1.0	<1.0
Thallium	mg/L	<0.0001	Toluene	µg/L	<1.0	<1.0
Titanium	mg/L	<0.050	1,1,1-Trichloroethane	µg/L	<1.0	<1.0
Vanadium	mg/L	<0.050	1,1,2-Trichloroethane	µg/L	<1.0	<1.0
Zinc	mg/L	0.08	Trichloroethylene	µg/L	<1.0	<1.0
GROUP G			**VOLATILE ORGANIC COMPOUNDS**			
Residue Total	mg/L	NRA*	Trichlorofluoromethane	µg/L	<1.0	<1.0
Residue , Filterable (TDS)	mg/L	NRA*	1,2,3-Trichloropropane	µg/L	<1.0	<1.0
Residue, Nonfilterable (TSS)	mg/L	NRA*	Vinyl Chloride	µg/L	<1.0	<1.0
Surfactants-MBAs	mg/L	NRA*	o-Xylene	µg/L	<1.0	<1.0
			m-Xylene	µg/L	<1.0	<1.0
EPA METHOD 615 (ug/L)						
2,4-D	µg/L	NRA*				
2,4-DB	µg/L	NRA*				
Dalapon	µg/L	NRA*				
Dicamba	µg/L	NRA*				
Dichloroprop	µg/L	NRA*				
Dinoseb	µg/L	NRA*				
MCPA	µg/L	NRA*				
MCPP	µg/L	NRA*				
Silvex	µg/L	NRA*				
2,4,5-T	µg/L	NRA*				
EPA METHOD NYAPC-44						
Glycols (Total)	µg/L	1,213.20				

TABLE C-3: SPIKE SAMPLE ANALYTICAL RESULTS
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		SS-1 (16-Nov-95)	SS-2 (16-Nov-95)	
GROUP A & B ANALYTES (mg/L)	UNITS	Thursday	Thursday	Performance Acceptance Limits (PAL)
Chemical Oxygen Demand	mg/L	121	106	109 - 147
Oil and Grease	mg/L	48	64	30.1 - 62.8 mg/bottle
Total Petroleum Hydrocarbons	mg/L	44	48	NPAL*
GROUP D ANALYTES				
Cyanide (Total)	mg/L	0.192	0.21	0.183 - 0.319
GROUP E ANALYTES	µg/L			
Phenols		225	225	190 - 310
GROUP C ANALYTES				
Ammonia	mg/L	7.4	9.2	NPAL
Kjeldahl Nitrogen (Total)	mg/L	8.5	7.3	5.74 - 8.26 mg/L
GROUP F ANALYTES				Expressed in mg/L
Aluminum	mg/L	0.538	0.618	0.486 - 0.700
Antimony	mg/L	0.104	0.132	0.0833 - 0.139
Arsenic	mg/L	0.044	0.052	0.0389 - 0.0612
Barium	mg/L	0.264	0.284	0.243 - 0.349
Beryllium	mg/L	0.081	0.087	0.0729 - 0.105
Cadmium	mg/L	0.071	0.079	0.0668 - 0.0962
Total Chromium	mg/L	0.213	0.235	0.189 - 0.271
Cobalt	mg/L	0.524	0.601	0.456 - 0.656
Copper	mg/L	0.411	0.439	0.367 - 0.529
Iron	mg/L	0.155	0.17	0.0869 - 0.144
Lead	mg/L	0.396	0.446	0.353 - 0.507
Manganese	mg/L	0.151	0.164	0.134 - 0.192
Mercury	mg/L	0.0005	0.0006	0.132 - 0.244
Molybdenum	mg/L	0.188	0.21	0.00397 - 0.00834
Nickel	mg/L	0.298	0.333	0.262 - 0.376
Selenium	mg/L	0.176	0.2	0.134 - 0.210
Silver	mg/L	0.08	0.085	0.0229 - 0.105
Thallium	mg/L	0.044	0.05	0.0389 - 0.0649
Vanadium	mg/L	0.103	0.112	0.0959 - 0.138
Zinc	mg/L	0.415	0.447	0.389 - 0.559
GROUP G				
Residue Total	mg/L	700	760	638 - 674
Residue , Filterable (TDS)	mg/L	558	618	623 - 677
Residue, Non Filterable (TSS)	mg/L	18	32	39.6 - 54.2
Surfactants-MBAs	mg/L	<0.1	<0.1	NPAL

Note: 1) Shaded values not within PAL range.
2) NPAL - No PAL value available.

TABLE C-4: DUPLICATE SAMPLE ANALYTICAL RESULTS
SITE 9, MANHOLE #514
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		17-Nov-95	17-Nov-95
	UNITS	Friday	DUPLICATE
GROUP A & B ANALYTES			
Chemical Oxygen Demand "B"	mg/L	810	418
Oil and Grease "B"	mg/L	41.6	52.8
Total Petroleum Hydrocarbon "B"	mg/L	41.6	11.2
GROUP C ANALYTES			
Ammonia	mg/L	43.6	31
Kjeldahl Nitrogen (total) "B"	mg/L	135	73
GROUP D ANALYTES			
Cyanide (Total)	mg/L	<0.005	<0.005
GROUP E ANALYTES			
Phenols	µg/L	20	20
GROUP F ANALYTES			
Aluminum	mg/L	0.164	0.262
Antimony	mg/L	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005
Barium	mg/L	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001
Chromium "B"	mg/L	0.011	0.011
Cobalt	mg/L	<0.050	0.050
Copper "B"	mg/L	0.065	0.045
Iron "B"	mg/L	0.604	0.675
Lead "B"	mg/L	<0.005	<0.005
Manganese	mg/L	<0.030	0.031
Mercury	mg/L	<0.0002	<0.0002
Molybdenum	mg/L	0.092	<0.030
Nickel "B"	mg/L	<0.030	<0.030
Selenium	mg/L	<0.005	<0.005
Silver	mg/L	<0.010	<0.010
Thallium	mg/L	<0.001	<0.001
Titanium	mg/L	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050
Zinc "B"	mg/L	0.107	0.127
GROUP G			
Residue Total "B"	mg/L	1710	575
Residue, Filterable (TDS) "B"	mg/L	1632	384
Residue, Nonfilterable (TSS)	mg/L	80	228
Surfactants-MBAs	mg/L	1.4	1.4
ON SITE ANALYSES			
pH	units	4	4
Temperature	°C	10	10

TABLE C-4: DUPLICATE SAMPLE ANALYTICAL RESULTS

SITE 9, MANHOLE #514

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

	UNITS	17-Nov-95 Friday	17-Nov-95 DUPLICATE
VOLATILE ORGANIC COMPOUNDS			
Benzene	µg/L	<1	<1
Benzyl Chloride	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
Bromodichloromethane "B"	µg/L	<1	<1
Bromoform	µg/L	<1	<1
Bromomethane	µg/L	<1	<1
Carbon tetrachloride	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1
Chlorodibromomethane	µg/L	<1	<1
Chloroethane	µg/L	<1	<1
Chloroform "B"	µg/L	1.9	1.9
2-Chlorethylvinyl Ether	µg/L	<1	<1
Chloromethane	µg/L	<1	<1
Chlorodibromomethane	µg/L	<1	<1
Dibromomethane	µg/L	<1	<1
1,2-Dichlorobenzene	µg/L	<1	<1
1,3-Dichlorobenzene	µg/L	<1	<1
1,4-Dichlorobenzene	µg/L	<1	<1
Dichlorodifluoromethane	µg/L	<1	<1
1,1-Dichloroethane	µg/L	<1	<1
1,2-Dichloroethane	µg/L	<1	<1
1,1-Dichloroethene	µg/L	<1	<1
Trans-1,2-Dichloroethene	µg/L	<1	<1
1,2-Dichloroethene	µg/L	<1	<1
1,2-Dichloropropane	µg/L	<1	<1
Cis-1,3-Dichloropropene	µg/L	<1	<1
Trans-1,3-Dichloropropene	µg/L	<1	<1
Ethyl Benzene	µg/L	<1	<1
Methylene Chloride	µg/L	<1	<1
1,1,1,2-Tetrachloroethane	µg/L	<1	<1
1,1,2,2-Tetrachloroethane "B"	µg/L	<1	<1
Tetrachloroethylene	µg/L	<1	<1
Toluene	µg/L	1.5	1.5
1,1,1-Trichloroethane	µg/L	<1	<1
1,1,2-Trichloroethane	µg/L	<1	<1
Trichloroethylene	µg/L	<1	<1
Trichlorofluoromethane	µg/L	<1	<1
1,2,3-Trichloropropane	µg/L	<1	<1
Vinyl Chloride	µg/L	<1	<1
o-Xylene	µg/L	<1	<1
p,m-Xylene	µg/L	<1	<1
HERBICIDES			
2,4-D	µg/L	<1.2	<1.2
2,4-DB	µg/L	<0.91	<0.91
Dalapon	µg/L	22.9	13.4
Dicamba	µg/L	<0.27	<0.27
Dichloroprop	µg/L	<0.65	<0.65
Dinoseb	µg/L	<0.07	<0.07
MCPA	µg/L	<249	<249
MCPP	µg/L	<192	<192
Silvex	µg/L	<0.17	<0.17
2,4,5-T	µg/L	<0.20	<0.20
Glycols (Total) "B"	µg/L	1005.8	<50

Note: 1) Acetone and other fuel hydrocarbons present in all VOC analysis

2) 15.51 ug/L 2-Butanone (MEK) and 43.3 ug/L Acetone were tentatively identified in the VOC sample analyses on 22 November 1995.

3) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s)

TABLE C-5: VISITOR CENTER

BACKGROUND POTABLE WATER SAMPLE ANALYTICAL RESULTS

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

	UNITS	16-Nov-95 Thursday
GROUP A & B ANALYTES		
Chemical Oxygen Demand	mg/L	14
Oil and Grease	mg/L	4.8
Total Petroleum Hydrocarbon	mg/L	4.8
GROUP C ANALYTES		
Ammonia	mg/L	<0.2
Kjeldahl Nitrogen (Total)	mg/L	0.8
GROUP D ANALYTES		
Cyanide (Total)	mg/L	<0.005
GROUP E ANALYTES		
Phenols	µg/L	<10
GROUP F ANALYTES		
Aluminum	mg/L	0.035
Antimony	mg/L	<0.003
Arsenic	mg/L	<0.005
Barium	mg/L	<0.050
Beryllium	mg/L	<0.001
Cadmium	mg/L	<0.001
Total Chromium	mg/L	<0.010
Cobalt	mg/L	<0.050
Copper	mg/L	<0.010
Iron	mg/L	<0.030
Lead	mg/L	<0.005
Manganese	mg/L	<0.030
Mercury	mg/L	<0.0002
Molybdenum	mg/L	<0.030
Nickel	mg/L	<0.030
Selenium	mg/L	<0.005
Silver	mg/L	<0.010
Thallium	mg/L	<0.001
Titanium	mg/L	<0.050
Vanadium	mg/L	<0.050
Zinc	mg/L	<0.050
GROUP G		
Langelier Index	mg/L	-3.39
Residue Total	mg/L	82
Residue, Filterable (TDS)	mg/L	65
Residue, Nonfilterable (TSS)	mg/L	3
Surfactants-MBAs	mg/L	<0.1
ON SITE ANALYSES		
pH	units	5
Temperature	(°C)	5.6
HERBICIDES		
2,4-D	µg/L	<1.2
2,4-DB	µg/L	<0.91
Dalapon	µg/L	9.82
Dicamba	µg/L	<0.27
Dichloroprop	µg/L	<0.65
Dinoseb	µg/L	<0.07
MCPA	µg/L	<249
MCPP	µg/L	<192
Silvex	µg/L	<0.17
2,4,5-T	µg/L	<0.20

	UNITS	16-Nov-95 Thursday
Volatile Organic Compounds		
Benzene	µg/L	<1.0
Benzyl Chloride	µg/L	<1.0
Bromobenzene	µg/L	<1.0
Bromodichloromethane	µg/L	2.8
Bromoform	µg/L	<1.0
Bromomethane	µg/L	<1.0
Carbon tetrachloride	µg/L	<1.0
Chlorobenzene	µg/L	<1.0
Chlorodibromomethane	µg/L	<1.0
Chloroethane	µg/L	<1.0
Chloroform	µg/L	40.8
2-Chlorethylvinyl Ether	µg/L	<1.0
Chloromethane	µg/L	<1.0
Chlorodibromomethane	µg/L	<1.0
Dibromomethane	µg/L	<1.0
1,2-Dichlorobenzene	µg/L	<1.0
1,3-Dichlorobenzene	µg/L	<1.0
1,4-Dichlorobenzene	µg/L	<1.0
Dichlorodifluoromethane	µg/L	<1.0
1,1-Dichloroethane	µg/L	<1.0
1,2-Dichloroethane	µg/L	<1.0
1,1-Dichloroethene	µg/L	<1.0
Trans-1,2-Dichloroethene	µg/L	<1.0
1,2-Dichloroethene	µg/L	<1.0
1,2-Dichloropropane	µg/L	<1.0
Cis-1,3-Dichloropropene	µg/L	<1.0
Trans-1,3-Dichloropropene	µg/L	<1.0
Ethyl Benzene	µg/L	<1.0
Methylene Chloride	µg/L	<1.0
1,1,1,2-Tetrachloroethane	µg/L	<1.0
1,1,2,2-Tetrachloroethane	µg/L	<1.0
Tetrachloroethylene	µg/L	<1.0
Toluene	µg/L	<1.0
1,1,1-Trichloroethane	µg/L	<1.0
1,1,2-Trichloroethane	µg/L	<1.0
Trichloroethylene	µg/L	<1.0
Trichlorofluoromethane	µg/L	<1.0
1,2,3-Trichloropropane	µg/L	<1.0
Vinyl Chloride	µg/L	<1.0
o-Xylene	µg/L	<1.0
m-Xylene	µg/L	<1.0
TOTAL TRIHALOMETHANES		
Bromodichloromethane	µg/L	3.5
Bromoform	µg/L	<0.5
Chloroform	µg/L	58.6
Chlorodibromomethane	µg/L	<0.5
Total Trihalomethane	µg/L	62.1

APPENDIX D

TABLE D-1: SAMPLE ANALYTICAL RESULTS - SITE 1, BASE DISCHARGE POINT

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
GROUP A & B ANALYTES								
Chemical Oxygen Demand "B"	mg/L	379	241	347	281	275	186	219
Oil and Grease "B"	mg/L	11.2	35.2	72	1760	68.8	20.8	120
Total Petroleum Hydrocarbon "B"	mg/L	11.2	35.2	64	352	24	20.8	120
GROUP C ANALYTES								
Ammonia	mg/L	21.8	19	20.2	19.8	18	24	25.2
Kjeldahl Nitrogen (Total) "B"	mg/L	26.5	28	24.5	23.5	24	31	32
GROUP D ANALYTES								
Cyanide (Total)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
GROUP E ANALYTES								
Phenols	ug/L	35	24	17	41	50	22	25
GROUP F ANALYTES								
Aluminum	mg/L	1.31	1.03	0.759	0.579	1.75	1.567	1.144
Antimony	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	mg/L	0.066	<0.050	<0.050	<0.050	0.05	0.081	0.05
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium "B"	mg/L	<0.010	0.013	0.04	0.019	0.049	<0.050	0.023
Cobalt	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.039	0.037	0.023	0.019	0.036	0.04	0.035
Iron "B"	mg/L	1.15	0.784	0.877	0.314	0.902	1.616	1.137
Lead "B"	mg/L	<0.020	<0.005	0.006	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.034	<0.030
Mercury	mg/L	0.0005	0.0011	<0.0002	<0.0002	0.0004	0.0007	0.0057
Molybdenum	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Nickel "B"	mg/L	<0.030	<0.030	<0.030	<0.030	0.033	0.03	<0.020
Selenium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005
Silver	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Thallium	mg/L	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.001	<0.001
Titanium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Zinc "B"	mg/L	0.092	0.107	0.107	0.053	0.101	0.09	0.101
GROUP G								
Residue Total "B"	mg/L	456	377	254	327	387	562	450
Residue, Filterable (TDS) "B"	mg/L	248	184	236	512	240	256	380
Residue, Nonfilterable (TSS)	mg/L	220	148	31	68	92	260	180
Surfactants-MBAs	mg/L	2.38	0.8	1.5	2.4	2.8	2	2.8
SAMPLE NUMBERS		GN951535	GN951571	GN951613	GN951649	GN951685	GN951703	GN951721
		GN951536	GN951572	GN951614	GN951650	GN951686	GN951704	GN951722
		GN951537	GN951573	GN951615	GN951651	GN951687	GN951705	GN951723
ON SITE ANALYSES								
pH	units	6	NA*	5	6	6	5	6.5
Temperature	(°C)	12	NA*	7	18	16	17	16

TABLE D-1: SAMPLE ANALYTICAL RESULTS - SITE 1, BASE DISCHARGE POINT

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
VOLATILE ORGANIC COMPOUNDS**								
Benzene	ug/L	<1	<1	<1	<1	<1	<1	<5
Benzyl Chloride	ug/L	<1	<1	<1	<1	<1	<1	<5
Bromobenzene	ug/L	<1	<1	<1	<1	<1	<1	<5
Bromodichloromethane "B"	ug/L	<1	<1	<1	<1	<1	<1	<5
Bromoform	ug/L	<1	<1	<1	<1	<1	<1	<5
Bromomethane	ug/L	<1	<1	<1	<1	<1	<1	<5
Carbon tetrachloride	ug/L	<1	<1	<1	<1	<1	<1	<5
Chlorobenzene	ug/L	<1	<1	<1	<1	<1	<1	<5
Chlorodibromomethane	ug/L	<1	<1	<1	<1	<1	<1	<5
Chloroethane	ug/L	<1	<1	<1	<1	<1	<1	<5
Chloroform "B"	ug/L	5.3	3.7	4.7	4.1	4.6	4.5	<5
2-Chlorethylvinyl Ether	ug/L	<1	<1	<1	<1	<1	<1	<5
Chloromethane	ug/L	<1	<1	<1	<1	<1	<1	<5
Chlorodibromomethane	ug/L	<1	<1	<1	<1	<1	<1	<5
Dibromomethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichlorobenzene	ug/L	<1	<1	<1	<1	<1	<1	<5
1,3-Dichlorobenzene	ug/L	<1	<1	<1	<1	<1	<1	<5
1,4-Dichlorobenzene	ug/L	1.3	1	<1	<1	<1	<1	<5
Dichlorodifluoromethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,1-Dichloroethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichloroethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,1-Dichloroethene	ug/L	<1	<1	<1	<1	<1	<1	<5
Trans-1,2-Dichloroethene	ug/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichloroethene	ug/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichloropropane	ug/L	<1	<1	<1	<1	<1	<1	<5
Cis-1,3-Dichloropropene	ug/L	<1	<1	<1	<1	<1	<1	<5
Trans-1,3-Dichloropropene	ug/L	<1	<1	<1	<1	<1	<1	<5
Ethyl Benzene	ug/L	<1	<1	<1	<1	<1	<1	<5
Methylene Chloride	ug/L	<1	<1	<1	<1	<1	<1	<5
1,1,1,2-Tetrachloroethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,1,2,2-Tetrachloroethane "B"	ug/L	<1	<1	<1	<1	<1	<1	<5
Tetrachloroethylene	ug/L	<1	<1	<1	<1	<1	<1	<5
Toluene	ug/L	<1	<1	<1	<1	1.3	<1	<5
1,1,1-Trichloroethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,1,2-Trichloroethane	ug/L	<1	<1	<1	<1	<1	<1	<5
Trichloroethylene	ug/L	<1	<1	<1	<1	<1	<1	<5
Trichlorofluoromethane	ug/L	<1	<1	<1	<1	<1	<1	<5
1,2,3-Trichloropropane	ug/L	<1	<1	<1	<1	<1	<1	<5
Vinyl Chloride	ug/L	<1	<1	<1	<1	<1	<1	<5
o-Xylene	ug/L	<1	<1	<1	<1	<1	<1	<5
p,m-Xylene	ug/L	<1	<1	<1	<1	<1	<1	<5
SAMPLE NUMBER		GN951538	GN951574	GN951616	GN951652	GN951688	GN951706	GN951724

TABLE D-1: SAMPLE ANALYTICAL RESULTS - SITE 1, BASE DISCHARGE POINT

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
HERBICIDES								
2,4-D	µg/L	<1.2	<1.2	SCB***	<1.2	<1.2	<1.2	<1.2
2,4-DB	µg/L	<0.91	<0.91	SCB***	<0.91	<0.91	<0.91	<0.91
Dalapon	µg/L	6.29	9.09	SCB***	6.46	7.43	13	10.6
Dicamba	µg/L	<0.27	<0.27	SCB***	<0.27	<0.27	<0.27	<0.27
Dichloroprop	µg/L	<0.65	<0.65	SCB***	<0.65	<0.65	<0.65	<0.65
Dinoseb	µg/L	<0.07	<0.07	SCB***	<0.07	<0.07	<0.07	<0.07
MCPA	µg/L	<249	<249	SCB***	<249	<249	<249	<249
MCPP	µg/L	<192	<192	SCB***	<192	<192	<192	<192
Silvex	µg/L	<0.17	<0.17	SCB***	<0.17	<0.17	<0.17	<0.17
2,4,5-T	µg/L	<0.20	<0.20	SCB***	<0.20	<0.20	<0.20	<0.20
SAMPLE NUMBER		GN951539	GN951575	GN951617	GN951653	GN951689	GN951707	GN951725
EPA METHOD NYAPC-44								
Glycols (Total) "B"	µg/L	843.55	962.87	734.91	944.48	1381.16	879.51	1231.72
SAMPLE NUMBER		CN951540	CN951576	CN941618	CN951654	CN951690	CN951708	CN951726

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.
2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).
3) NA* - Not analyzed.
4) Volatile Organic Compounds** - Acetone and other fuel hydrocarbons were detected in all VOC sample analyses.
5) SCB*** - Sample container broke.

TABLE D-2: SAMPLE ANALYTICAL RESULTS - SITE 2, MANHOLE #2

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		17-Nov-95	18-Nov-95	21-Nov-95
GROUP A & B ANALYTES	**UNITS**	**Friday**	**Saturday**	**Tuesday**
Chemical Oxygen Demand "B"	mg/L	309	407	85
Oil and Grease "B"	mg/L	52.6	89.6	1120
Total Petroleum Hydrocarbon "B"	mg/L	4.8	4.8	768
GROUP C ANALYTES				
Ammonia	mg/L	22	24	20.4
Kjeldahl Nitrogen (Total) "B"	mg/L	26	29.5	0.3
GROUP E ANALYTES				
Phenols	µg/L	24	<10	10
GROUP F ANALYTES				
Aluminum	mg/L	0.191	0.212	0.105
Antimony	mg/L	<0.003	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005
Barium	mg/L	<0.050	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001
Chromium "B"	mg/L	<0.010	0.016	<0.010
Cobalt	mg/L	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.039	0.033	0.027
Iron "B"	mg/L	0.783	0.621	0.606
Lead "B"	mg/L	<0.020	0.007	<0.005
Manganese	mg/L	<0.030	0.03	<0.030
Mercury	mg/L	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.030	<0.030	<0.030
Nickel "B"	mg/L	<0.030	<0.030	<0.030
Selenium	mg/L	<0.005	<0.0005	<0.005
Silver	mg/L	<0.010	<0.010	<0.010
Thallium	mg/L	<0.001	<0.0001	0.002
Titanium	mg/L	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050
Zinc "B"	mg/L	<0.050	<0.050	0.054
SAMPLE NUMBER		CN951541	CN951577	CN951619
		CN951542	CN951578	CN951620
		GN951543	GN951579	GN951621
ON SITE ANALYSES				
pH		6	6	5
Temperature	°C	13	13	11

TABLE D-3: SITE 3, MANHOLE #11

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

	UNITS	16-Nov-95 Thursday	17-Nov-95 Friday	18-Nov-95 Saturday	19-Nov-95 Sunday	20-Nov-95 Monday	21-Nov-95 Tuesday	22-Nov-95 Wednesday
GROUP A & B ANALYTES								
Chemical Oxygen Demand "B"	mg/L	263	260	207	313	409	132	193
Oil and Grease "B"	mg/L	28.8	19.2	43.2	80	38.4	25.6	28
Total Petroleum Hydrocarbon "B"	mg/L	11.2	4.8	30.4	80	14.4	20.8	7.2
GROUP C ANALYTES								
Ammonia	mg/L	21	21	14.4	17.2	10	21.2	17.2
Kjeldahl Nitrogen (Total) "B"	mg/L	26	25	21	34	18	27.5	24
GROUP D ANALYTES								
Cyanide (Total)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
GROUP E ANALYTES								
Phenols	ug/L	64	28	71	41	<10	15	20
GROUP F ANALYTES								
Aluminum	mg/L	1.19	0.475	1.15	1.09	2.52	1.171	0.934
Antimony	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Chromium "B"	mg/L	0.012	0.013	0.032	0.018	0.022	<0.050	0.019
Cobalt	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.035	0.025	0.021	0.024	0.023	0.022	<0.020
Iron "B"	mg/L	0.449	0.463	0.456	0.302	0.397	0.305	0.309
Lead "B"	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.03	<0.030
Nickel "B"	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.020
Selenium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005
Silver	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Thallium	mg/L	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.001	<0.001
Titanium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Zinc "B"	mg/L	0.065	0.067	0.066	0.063	0.127	0.05	<0.050
GROUP G								
Residue Total "B"	mg/L	388	393	276	471	502	528	6861
Residue, Filterable (TDS) "B"	mg/L	280	244	210	224	300	484	1284
Residue, Nonfilterable (TSS)	mg/L	156	120	24	214	88	136	168
Surfactants-MBAs	mg/L	1.8	1.4	2.9	2.5	5.6	3.2	4
SAMPLE NUMBER		CN951545	CN951581	CN951623	CN951659	CN951691	CN951709	CN951727
		CN951546	CN951582	CN951624	CN951660	CN951692	CN951710	CN951728
		GN951547	GN951583	GN951625	GN951661	GN951693	GN951711	GN951729
ON SITE ANALYSES								
pH	units	6	6.5	6	6	6	5	6.5
Temperature	°C	12	10	10	19	16	18	16

TABLE D-3: SITE 3, MANHOLE #11
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
Benzene	µg/L	<1	<5	<1	<1	<1	<1	<5
Benzyl Chloride	µg/L	<1	<5	<1	<1	<1	<1	<5
Bromobenzene	µg/L	<1	<5	<1	<1	<1	<1	<5
Bromodichloromethane "B"	µg/L	<1	<5	<1	<1	<1	<1	<5
Bromoform	µg/L	<1	<5	<1	<1	<1	<1	<5
Bromomethane	µg/L	<1	<5	<1	<1	<1	<1	<5
Carbon tetrachloride	µg/L	<1	<5	<1	<1	<1	<1	<5
Chlorobenzene	µg/L	<1	<5	<1	<1	<1	<1	<5
Chlorodibromomethane	µg/L	<1	<5	<1	<1	<1	<1	<5
Chloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
Chloroform "B"	µg/L	6.6	5.9	9.5	9	9.2	8	5.23
2-Chlorethylvinyl Ether	µg/L	<1	<5	<1	<1	<1	<1	<5
Chloromethane	µg/L	<1	<5	<1	<1	<1	<1	<5
Chlorodibromomethane	µg/L	<1	<5	<1	<1	<1	<1	<5
Dibromomethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,2-Dichlorobenzene	µg/L	<1	<5	<1	<1	<1	<1	<5
1,3-Dichlorobenzene	µg/L	<1	<5	<1	<1	<1	<1	<5
1,4-Dichlorobenzene	µg/L	<1	<5	<1	<1	<1	<1	<5
Dichlorodifluoromethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,1-Dichloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,2-Dichloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,1-Dichloroethene	µg/L	<1	<5	<1	<1	<1	<1	<5
Trans-1,2-Dichloroethene	µg/L	<1	<5	<1	<1	<1	<1	<5
1,2-Dichloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,2-Dichloropropane	µg/L	<1	<5	<1	<1	<1	<1	<5
Cis-1,3-Dichloropropene	µg/L	<1	<5	<1	<1	<1	<1	<5
Trans-1,3-Dichloropropene	µg/L	<1	<5	<1	<1	<1	<1	<5
Ethyl Benzene	µg/L	<1	<5	<1	<1	<1	<1	<5
Methylene Chloride	µg/L	<1	<5	<1	<1	<1	<1	<5
1,1,1,2-Tetrachloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,1,2,2-Tetrachloroethane "B"	µg/L	<1	<5	<1	<1	<1	<1	<5
Tetrachloroethylene	µg/L	<1	<5	<1	<1	<1	<1	<5
Toluene	µg/L	<1	<5	<1	<1	<1	<1	<5
1,1,1-Trichloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,1,2-Trichloroethane	µg/L	<1	<5	<1	<1	<1	<1	<5
Trichloroethylene	µg/L	<1	<5	<1	<1	<1	<1	<5
Trichlorofluoromethane	µg/L	<1	<5	<1	<1	<1	<1	<5
1,2,3-Trichloropropane	µg/L	<1	<5	<1	<1	<1	<1	<5
Vinyl Chloride	µg/L	<1	<5	<1	<1	<1	<1	<5
o-Xylene	µg/L	<1	<5	<1	<1	<1	<1	<5
p,m-Xylene	µg/L	<1	<5	<1	<1	<1	<1	<5
SAMPLE NUMBER		GN951550	GN951586	GN951628	GN951664	GN951696	GN951714	GN951732

TABLE D-3: SITE 3, MANHOLE #11
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
Herbicides								
2,4-D	µg/L	<1.2	<1.2	SCB*	<1.2	<1.2	<1.2	<1.2
2,4-DB	µg/L	<0.91	<0.91	SCB*	<0.91	<0.91	<0.91	<0.91
Dalapon	µg/L	10.5	10.4	SCB*	<5.8	10.1	16.2	13.8
Dicamba	µg/L	<0.27	<0.27	SCB*	<0.27	<0.27	<0.27	<0.27
Dichloroprop	µg/L	<0.65	<0.65	SCB*	<0.65	<0.65	<0.65	<0.65
Dinoseb	µg/L	<0.07	<0.07	SCB*	<0.07	<0.07	<0.07	<0.07
MCPA	µg/L	<249	<249	SCB*	<249	<249	<249	<249
MCPP	µg/L	<192	<192	SCB*	<192	<192	<192	<192
Silvex	µg/L	<0.17	<0.17	SCB*	<0.17	<0.17	<0.17	<0.17
2,4,5-T	µg/L	<0.20	<0.20	SCB*	<0.20	<0.20	<0.20	<0.20
SAMPLE NUMBER		GN951548	GN951585	GN951626	GN951662	GN951694	GN951712	GN951730
EPA METHOD NYAPC-44								
Glycols (Total) "B"	µg/L	<50	912.06	1005.06	1238	542.11	454.73	666.7
SAMPLE NUMBER		CN951549	CN951584	CN941627	CN951663	CN951695	CN951713	CN951731

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.
2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).
3) Sample collected broke

TABLE D-4: SAMPLE ANALYTICAL RESULTS
SITE 4, Housing , Manhole #141
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		17-Nov-95	18-Nov-95	21-Nov-95
GROUP A & B ANALYTES	UNITS	Friday	Saturday	Tuesday
Chemical Oxygen Demand "B"	mg/L	340	112	231
Oil and Grease "B"	mg/L	33.6	4.8	17.6
Total Petroleum Hydrocarbon "B"	mg/L	11.2	16	17.6
GROUP E ANALYTES				
Phenols	µg/L	35	20	10
GROUP G				
Residue Total "B"	mg/L	403	301	345
Residue, Filterable (TDS) "B"	mg/L	236	172	268
Residue, Nonfilterable (TSS)	mg/L	140	48	92
Surfactants-MBAs	mg/L	1.6	1.3	6.2
ON SITE ANALYSES				
pH	units	6.5	6.5	5
Temperature	°C	11	20	12
SAMPLE NUMBER		CN951551	CN951587	CN951629
		GN951552	GN951588	GN951630

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.
2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

TABLE D-5: SAMPLE ANALYTICAL RESULTS - SITE 5, Area Dental Lab
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		17-Nov-95	18-Nov-95	21-Nov-95
GROUP A & B ANALYTES	**UNITS**	**Friday**	**Saturday**	**Tuesday**
Chemical Oxygen Demand "B"	mg/L	50	83	71
Oil and Grease "B"	mg/L	4.8	11.2	6
Total Petroleum Hydrocarbon "B"	mg/L	<1.0	4.8	2.7
GROUP E ANALYTES				
Phenols	µg/L	15	<10	10
GROUP F ANALYTES				
Aluminum	mg/L	0.069	0.153	1.662
Antimony	mg/L	0.005	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005
Barium	mg/L	<0.050	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001
Chromium	mg/L	0.013	0.015	<0.010
Cobalt	mg/L	<0.050	<0.050	<0.050
Copper	mg/L	0.019	0.023	0.04
Iron	mg/L	0.265	0.443	0.691
Lead	mg/L	<0.005	<0.005	0.005
Manganese	mg/L	<0.030	<0.030	<0.030
Mercury	mg/L	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.030	<0.030	<0.030
Nickel	mg/L	<0.030	<0.030	<0.030
Selenium	mg/L	<0.005	<0.005	<0.005
Silver	mg/L	<0.010	<0.010	<0.010
Thallium	mg/L	<0.0001	<0.0001	<0.001
Titanium	mg/L	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050
Zinc	mg/L	0.06	0.064	0.075
ON SITE ANALYSES				
pH	units	6	6.5	5
Temperature	°C	6	12	8
SAMPLE NUMBER		CN951553	CN951589	CN951631
		CN951554	CN951591	CN951632
		GN951555		GN951633

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.

2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

TABLE D-6: SAMPLE ANALYTICAL RESULTS - SITE 6, MANHOLE #69
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95
GROUP A & B ANALYTES	**UNITS**	**Thursday**	**Friday**	**Saturday**
Chemical Oxygen Demand "B"	mg/L	422	398	195
Oil and Grease "B"	mg/L	35.2	104	25.6
Total Petroleum Hydrocarbon "B"	mg/L	14.4	11.2	9.6
GROUP E ANALYTES				
Phenols	µg/L	10	139	29
GROUP F ANALYTES				
Aluminum	mg/L	0.641	0.961	0.04
Antimony	mg/L	<0.003	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005
Barium	mg/L	<0.050	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001
Chromium "B"	mg/L	0.013	0.017	<0.010
Cobalt	mg/L	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.055	0.035	0.018
Iron "B"	mg/L	0.862	0.762	0.531
Lead "B"	mg/L	<0.005	<0.005	<0.005
Manganese	mg/L	<0.030	0.024	0.037
Mercury	mg/L	0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.030	<0.030	<0.030
Nickel "B"	mg/L	<0.030	<0.030	<0.030
Selenium	mg/L	<0.005	<0.005	<0.005
Silver	mg/L	<0.010	<0.010	<0.010
Thallium	mg/L	<0.001	<0.001	<0.0001
Titanium	mg/L	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050
Zinc "B"	mg/L	0.111	0.085	0.093
ON SITE ANALYSES				
pH (units)	units	5	6.5	5
Temperature	°C	17	20	4
SAMPLE NUMBER		CN951556	CN951592	CN951634
		CN951557	CN951593	CN951635
		GN951558	GN951594	GN951636

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.
2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

TABLE D-7: SAMPLE ANALYTICAL RESULTS - SITE 7, MANHOLE #34a

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		17-Nov-95	18-Nov-95	21-Nov-96
GROUP A & B ANALYTES	UNITS	Friday	Saturday	Tuesday
Chemical Oxygen Demand "B"	mg/L	491	716	406
Oil and Grease "B"	mg/L	14.2	30.4	9.2
Total Petroleum Hydrocarbon "B"	mg/L	14.4	14.4	5.4
GROUP E ANALYTES				
Phenols	µg/L	35	46	10
GROUP F ANALYTES				
Aluminum	mg/L	0.131	0.142	0.097
Antimony	mg/L	0.003	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005
Barium	mg/L	<0.050	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001	<0.001
Cadmium	mg/L	0.002	0.001	<0.001
Chromium "B"	mg/L	0.014	0.02	<0.010
Cobalt	mg/L	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.039	0.032	0.021
Iron "B"	mg/L	1.54	2.8	1.358
Lead "B"	mg/L	0.042	0.032	<0.005
Manganese	mg/L	0.067	0.072	0.039
Mercury	mg/L	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.030	<0.030	<0.030
Nickel "B"	mg/L	<0.030	<0.030	<0.030
Selenium	mg/L	<0.005	<0.005	<0.005
Silver	mg/L	<0.010	<0.010	<0.010
Thallium	mg/L	<0.0001	<0.0001	0.001
Titanium	mg/L	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050
Zinc "B"	mg/L	0.21	0.162	0.08
ON SITE ANALYSES				
pH	units	6.5	6.5	5
Temperature	°C	18	18	10
SAMPLE NUMBER		CN951559	CN951595	CN951737
		CN951560	CN951596	CN951738
		GN951561	GN951597	GN951739

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.

2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

TABLE D-8: SITE 8, MANHOLE #45

PETERSON AIR FORCE BASE

WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		17-Nov-95	18-Nov-95	21-Nov-96
GROUP A & B ANALYTES	**UNITS**	**Friday**	**Saturday**	**Tuesday**
Chemical Oxygen Demand "B"	mg/L	355	331	128
Oil and Grease "B"	mg/L	14.2	19.2	192
Total Petroleum Hydrocarbon "B"	mg/L	8	4.8	180
GROUP E ANALYTES				
Phenols	µg/L	42	60	25
GROUP F ANALYTES				
Aluminum	mg/L	1.1	0.307	0.354
Antimony	mg/L	<0.003	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005
Barium	mg/L	0.083	<0.050	<0.050
Beryllium	mg/L	<0.001	<0.001	<0.001
Cadmium	mg/L	0.008	0.006	0.003
Chromium "B"	mg/L	0.02	0.023	<0.010
Cobalt	mg/L	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.087	0.047	0.049
Iron "B"	mg/L	2.72	1.57	1.526
Lead "B"	mg/L	0.05	0.043	0.013
Manganese	mg/L	0.089	0.075	0.058
Mercury	mg/L	0.0005	<0.0002	<0.0002
Molybdenum	mg/L	<0.030	<0.030	<0.030
Nickel "B"	mg/L	<0.030	<0.030	<0.030
Selenium	mg/L	<0.005	<0.005	<0.005
Silver	mg/L	<0.010	<0.010	<0.010
Thallium	mg/L	<0.001	<0.0001	<0.001
Titanium	mg/L	0.105	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050
Zinc "B"	mg/L	0.806	0.441	0.255
ON SITE ANALYSES				
pH	units	6.5	6	6.5
Temperature	°C	18	18	18
SAMPLE NUMBER		CN951562	CN951598	CN951640
		CN951563	CN951599	CN951641
		GN951564	GN951600	GN951642

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.

2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

TABLE D-9: SITE 9, MANHOLE #514

PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY

16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
GROUP A & B ANALYTES								
Chemical Oxygen Demand "B"	mg/L	850	810	397	866	958	466	703
Oil and Grease "B"	mg/L	62.4	41.6	1152	76.8	108.8	36	512
Total Petroleum Hydrocarbon "B"	mg/L	62.4	41.6	640	16	32	17.6	512
GROUP C ANALYTES								
Ammonia	mg/L	28.6	43.6	27.6	30.8	15.2	51	31.6
Kjeldahl Nitrogen (Total) "B"	mg/L	36	135	50	48	41	48.5	50
GROUP D ANALYTES								
Cyanide (Total)	mg/L	<0.005	<0.005	<0.005	0.005	0.008	<0.005	<0.005
GROUP E ANALYTES								
Phenols	µg/L	<10	20	69	30	<10	45	35
GROUP F ANALYTES								
Aluminum "B"	mg/L	0.146	0.164	0.145	0.294	2.26	0.403	0.433
Antimony	mg/L	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003
Arsenic	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	mg/L	<0.050	<0.050	0.194	0.280	0.302	0.381	0.269
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	0.072	<0.001	<0.001
Chromium "B"	mg/L	0.011	0.011	<0.010	0.021	0.069	<0.010	0.016
Cobalt	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Copper "B"	mg/L	0.064	0.065	0.04	0.079	0.126	0.071	0.065
Iron "B"	mg/L	0.527	0.604	0.314	1.01	5.27	0.674	1.477
Lead "B"	mg/L	<0.005	<0.005	0.005	<0.005	0.008	<0.005	<0.005
Manganese	mg/L	<0.030	<0.030	<0.030	0.031	0.079	0.049	0.039
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Molybdenum	mg/L	0.485	0.092	0.42	0.037	0.483	0.049	0.245
Nickel "B"	mg/L	<0.030	<0.030	<0.030	<0.030	0.072	0.203	<0.030
Selenium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005
Silver	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Thallium	mg/L	<0.001	<0.001	0.001	<0.0001	<0.0001	<0.001	<0.001
Titanium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vanadium	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Zinc "B"	mg/L	0.094	0.107	<0.050	0.156	1.65	0.212	0.194
GROUP G								
Residue Total "B"	mg/L	510	1710	733	745	1295	1109	1106
Residue, Filterable (TDS) "B"	mg/L	292	1632	520	394	380	660	764
Residue, Nonfilterable (TSS)	mg/L	152	80	80	74	124	400	348
Surfactants-MBAs	mg/L	1.4	1.4	2.2	1.4	2	1.2	2.5
SAMPLE NUMBER		CN951565	CN951601	CN951643	CN951679	CN951697	CN951715	CN951733
		CN951566	CN951602	CN951644	CN951680	CN951698	CN951716	CN951734
		GN951567	GN951603	GN951645	GN951681	GN951699	GN951717	GN951735
ON SITE ANALYSES								
pH	units	7	4	6	6.5	5	5	7
Temperature	°C	14	10	10	18	15	17	16

TABLE D-9: SITE 9, MANHOLE #514
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		16-Nov-95	17-Nov-95	18-Nov-95	19-Nov-95	20-Nov-95	21-Nov-95	22-Nov-95
	UNITS	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
Benzene	µg/L	<1	<1	<1	<1	<1	<1	<5
Benzyl Chloride	µg/L	<1	<1	<1	<1	<1	<1	<5
Bromobenzene	µg/L	<1	<1	<1	<1	<1	<1	<5
Bromodichloromethane "B"	µg/L	<1	<1	<1	<1	<1	<1	<5
Bromoform	µg/L	<1	<1	<1	<1	<1	<1	<5
Bromomethane	µg/L	<1	<1	<1	<1	<1	<1	<5
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1	<1	<5
Chlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<5
Chlorodibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<5
Chloroethane	µg/L	<1	<1	<1	<1	<1	<1	<5
Chloroform "B"	µg/L	2.4	1.9	5.8	2.5	3.2	7.5	<5
2-Chloroethylvinyl Ether	µg/L	<1	<1	<1	<1	<1	<1	<5
Chloromethane	µg/L	<1	<1	<1	<1	<1	<1	<5
Chlorodibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<5
Dibromomethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<5
1,3-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<5
1,4-Dichlorobenzene	µg/L	<1	<1	<1	<1	<1	<1	<5
Dichlorodifluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,1-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<5
Trans-1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichloroethene	µg/L	<1	<1	<1	<1	<1	<1	<5
1,2-Dichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<5
Cis-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<5
Trans-1,3-Dichloropropene	µg/L	<1	<1	<1	<1	<1	<1	<5
Ethyl Benzene	µg/L	<1	<1	<1	<1	<1	<1	<5
Methylene Chloride	µg/L	<1	<1	<1	<1	<1	<1	<5
1,1,1,2-Tetrachloroethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,1,2,2-Tetrachloroethane "B"	µg/L	<1	<1	<1	<1	<1	<1	<5
Tetrachloroethylene	µg/L	<1	<1	<1	<1	<1	<1	<5
Toluene	µg/L	1.5	1.5	1.3	2.6	1.5	<1	<5
1,1,1-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,1,2-Trichloroethane	µg/L	<1	<1	<1	<1	<1	<1	<5
Trichloroethylene	µg/L	<1	<1	<1	<1	<1	<1	<5
Trichlorofluoromethane	µg/L	<1	<1	<1	<1	<1	<1	<5
1,2,3-Trichloropropane	µg/L	<1	<1	<1	<1	<1	<1	<5
Vinyl Chloride	µg/L	<1	<1	<1	<1	<1	<1	<5
o-Xylene	µg/L	<1	<1	<1	<1	<1	<1	<5
p,m-Xylene	µg/L	<1	<1	<1	<1	<1	<1	<5
SAMPLE NUMBER		GN951570	GN951606	GN951648	GN951684	GN951702	GN951720	GN951738*
HERBICIDES								
2,4-D	µg/L	<1.2	<1.2	SCB*	<1.2	<1.2	<1.2	<1.2
2,4-DB	µg/L	<0.91	<0.91	SCB*	<0.91	<0.91	<0.91	<0.91
Dalapon	µg/L	12	22.9	SCB*	20.8	15.5	14.1	19.5
Dicamba	µg/L	<0.27	<0.27	SCB*	<0.27	<0.27	<0.27	<0.27
Dichloroprop	µg/L	<0.65	<0.65	SCB*	<0.65	<0.65	<0.65	<0.65
Dinoseb	µg/L	<0.07	<0.07	SCB*	<0.07	<0.07	<0.07	<0.07
MCPA	µg/L	<249	<249	SCB*	<249	<249	<249	<249
MCPP	µg/L	<192	<192	SCB*	<192	<192	<192	<192
Silvex	µg/L	<0.17	<0.17	SCB*	<0.17	<0.17	<0.17	<0.17
2,4,5-T	µg/L	<0.20	<0.20	SCB*	<0.20	<0.20	<0.20	<0.20
SAMPLE NUMBER		GN951568	GN951604	GN951646	GN951682	GN951700	GN951718	GN951736
EPA METHOD NYAPC-44								
Glycols (Total) "B"	µg/L	580.06	1005.8	1066.55	1169.93	1580.36	1692.24	951.42
SAMPLE NUMBER		CN951569	CN951605	CN941647	CN951683	CN951701	CN951719	CN951737

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.

2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

3) SCB* - Sample container broke.

4) Acetone and other fuel hydrocarbons present in all VOC analyses.

5) 15.51 ug/L 2-Butanone (MEK) and 43.3 ug/L Acetone were tentatively identified in the VOC sample analyses on 22 November 1995.

TABLE D-10: OIL WATER SEPARATOR GRAB SAMPLES
PETERSON AIR FORCE BASE WASTEWATER CHARACTERIZATION SURVEY
16-22 NOVEMBER 1995

		20-Nov-95	20-Nov-95	20-Nov-95			20-Nov-95
	UNITS	Monday	Monday	Monday		UNITS	Monday
GROUP A & B ANALYTES		MEDICAL FACILITY	CHILD CARE	PMEL	BASE/NEUTRAL ACIDS		PMEL
Chemical Oxygen Demand "B"	mg/L	21	NA*	30	Acenaphthene	µg/L	<5
					Acenaphthylene	µg/L	<5
GROUP F ANALYTES					Anthracene	µg/L	<5
Mercury	mg/L	0.003	NA	<0.0002	Benzidine	µg/L	<5
Silver	mg/L	<0.010	NA	NA	Benzo(a)anthracene	µg/L	<5
					Benzo(b)fluoranthene	µg/L	<5
GROUP G					Benzo(k)fluoranthene	µg/L	<5
Surfactants-MBAs	mg/L	<0.1	NA	<0.1	Benzo(a)pyrene	µg/L	<5
Langelier Index	units	NA*	-2.21	NA	Benzo(ghi)perylene	µg/L	<5
SAMPLE NUMBER		GN951780	GN951788	GN951782	Benzyl butyl phthalate	µg/L	<5
		GN951781		GN951783	Bis(2-chloroethyl)ether	µg/L	<5
					Bis(2-chloroethoxy)methane	µg/L	<5
GROUP A & B ANALYTES		MX DOCK B214	AC ENGINE INSP.	B503 AGE	Bis(2-ethylhexyl)phthalate	µg/L	<5
Oil and Grease "B"	mg/L	152	7600	80	Bis(2-chloroisopropyl)ether	µg/L	<5
Total Petroleum Hydrocarbon "B"	mg/L	48	5760	22.4	4-Bromophenyl phenyl ether	µg/L	<5
					2-Chloronaphthalene	µg/L	<5
GROUP E ANALYTES					4-Chlorophenyl phenyl ether	µg/L	<5
Phenols	µg/L	100	1960	415	Chrysene	µg/L	<5
					Dibenzo(a,h)anthracene	µg/L	<5
GROUP G					Di-n-butylphthalate	µg/L	<5
Surfactants-MBAs	mg/L	204	12.4	224	1,2-Dichlorobenzene	µg/L	<5
					1,3-Dichlorobenzene	µg/L	<5
SAMPLE NUMBER		GN951794	GN951797	GN951800	1,4-Dichlorobenzene	µg/L	<5
					3,3-Dichlorobenzidine	µg/L	<5
GROUP A & B ANALYTES		AC MX B625	AUTOHOBBY	OLD VEHICLE MX	Diethyl phthalate	µg/L	<5
Oil and Grease "B"	mg/L	8.8	2880	208	Dimethyl phthalate	µg/L	<5
Total Petroleum Hydrocarbon "B"	mg/L	NA	1760	144	2,4-Dinitrotoluene	µg/L	<5
					2,6-Dinitrotoluene	µg/L	<5
GROUP E ANALYTES					Di-n-Octyl phthalate	µg/L	<5
Phenols	µg/L	260	SCB**	125	Fluoranthene	µg/L	<5
					Fluorene	µg/L	<5
GROUP G					Hexachlorobenzene	µg/L	<5
Surfactants-MBAs	mg/L	0.32	NA	<0.1	Hexachlorobutadiene	µg/L	<5
SAMPLE NUMBER					Hexachlorocyclopentadiene	µg/L	<5
					Hexachloroethane	µg/L	<5
EPA METHOD NYAPC-44					Indeno(1,2,3-cd)pyrene	µg/L	<5
Glycols (Total) "B"	µg/L	NA	<50	SCB**	Isophorone	µg/L	<5
SAMPLE NUMBER		GN951803	GN951806	GN951813	Naphthalene	µg/L	<5
			GN951809	GN951816	Nitrobenzene	µg/L	<5
GROUP A & B ANALYTES		MATERIAL SUPPLY	WASHRACK B1229	CES WASHRACK	N-Nitrosodimethylamine	µg/L	<5
Oil and Grease	mg/L	2.72	17.6	32	N-Nitrosodi-n-propylamine	µg/L	<5
Total Petroleum Hydrocarbon	mg/L	1.92	12.8	25.6	N-Nitrosodiphenylamine	µg/L	<5
					Phenanthrene	µg/L	<5
GROUP E ANALYTES					Pyrene	µg/L	<5
Phenols	µg/L	10	<10	43	1,2,4-Trichlorobenzene	µg/L	<5
					2-Chlorophenol	µg/L	<5
GROUP G					2,4-Dichlorophenol	µg/L	<5
Surfactants-MBAs	mg/L	0.9	62	5.6	2,4-Dimethylphenol	µg/L	<5
					2,4-Dinitrophenol	µg/L	<5
EPA METHOD NYAPC-44					2-Methyl-4,6-dinitrophenol	µg/L	<5
					2-Nitrophenol	µg/L	<5
SAMPLE NUMBER		GN951817	GN951823	GN951827	4-Nitrophenol	µg/L	<5
			GN951820	GN951824	Pentachlorophenol	µg/L	<5
					Phenol	µg/L	<5
					2,4,6-Trichlorophenol	µg/L	<5
					SAMPLE NUMBER		GN951784

Note: 1) Shaded values exceed Colorado Springs POTW permissible concentration.

2) Parameters in bold with "B" qualifier indicate the contaminant was detected in blank sample(s).

4) NA* - Not Analyzed.

3) SCB** - Sample Container Broke.

APPENDIX E

Table E-1: Site CM-1 Cheyenne Mountain Effluent to Fort Carson
Wastewater Characterization Survey: 16-22 November 1995
Cheyenne Mountain AFB, CO

	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE
GROUP A & B ANALYTES (mg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
Chemical Oxygen Demand	88	83	58
Oil and Grease	14.4	64	40
Total Petroleum Hydrocarbon	8	64	14.4
Group C Analytes (mg/L)			
Ammonia	4.4	3.3	4.5
Kjeldahl Nitrogen (total)	6.9	7.1	9
GROUP D ANALYTES (mg/L)			
Cyanide (Total)	<0.005	<0.005	<0.005
GROUP E ANALYTES (µg/L)			
Phenols	33	<10	58
GROUP F ANALYTES (mg/L)			
Aluminum	0.086	0.114	0.041
Antimony	<0.003	<0.003	<0.003
Arsenic	<0.005	<0.005	<0.005
Barium	0.061	0.057	<0.050
Beryllium	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	<0.001
Chromium	0.014	0.069	0.025
Cobalt	<0.050	<0.050	<0.050
Copper	<0.010	0.01	<0.010
Iron	0.232	0.408	0.223
Lead	0.016	<0.005	<0.005
Manganese	<0.030	<0.030	<0.030
Mercury	<0.0002	<0.0002	<0.0002
Molybdenum	0.212	0.19	0.375
Nickel	<0.030	0.038	<0.030
Selenium	<0.005	<0.005	<0.010
Silver	<0.010	<0.010	<0.010
Thallium	<0.001	<0.0001	<0.001
Titanium	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050
Zinc	0.087	0.068	0.074
Group G (mg/L)			
Residue Total	262	270	540
Residue, Filterable (TDS)	182	160	532
Residue, Nonfilterable (TSS)	28	60	148
Surfactants-MBAs	0.1	0.3	0.6
ON SITE ANALYSES			
pH (units)	5	5	5
Temperature (°F)	49	49	50
SAMPLE NUMBERS	CN951943	CN951961	CN951979
	CN951944	CN951962	CN951980
	GN951945	GN951963	GN951981

Table E-1: Site CM-1 Cheyenne Mountain Effluent to Fort Carson
Wastewater Characterization Survey: 16-22 November 1995
Cheyenne Mountain AFB, CO

EPA METHOD 601/602	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE
VOLATILE COMPOUNDS (µg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
Benzene	<1	<1	<1
Benzyl Chloride	<1	<1	<1
Bromobenzene	<1	<1	<1
Bromodichloromethane	<1	<1	<1
Bromoform	<1	<1	<1
Bromomethane	<1	<1	<1
Carbon tetrachloride	<1	<1	<1
Chlorobenzene	<1	<1	<1
Chlorodibromomethane	<1	<1	<1
Chloroethane	<1	<1	<1
Chloroform	<1	<1	1.3
2-Chlorethylvinyl Ether	<1	<1	<1
Chloromethane	<1	<1	<1
Chlorodibromomethane	<1	<1	<1
Dibromomethane	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1
Dichlorodifluoromethane	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1
Trans-1,2-Dichloroethene	<1	<1	<1
1,2-Dichloroethene	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1
Cis-1,3-Dichloropropene	<1	<1	<1
Trans-1,3-Dichloropropene	<1	<1	<1
Ethyl Benzene	<1	<1	<1
Methylene Chloride	<1	<1	<1
1,1,1,2-Tetrachloroethane	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1
Tetrachloroethylene	<1	<1	<1
Toluene	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1
Trichloroethylene	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1
1,2,3-Trichloropropane	<1	<1	<1
Vinyl Chloride	<1	<1	<1
o-Xylene	<1	<1	<1
p,m-Xylene	<1	<1	<1
SAMPLE NUMBER	GN951946	GN951964	GN941982
EPA METHOD NYAPC-44 (µg/L)			
Glycols (total)	<50	<50	361.25
SAMPLE NUMBER	GN951948	CN951966	CN951984

TABLE E-2 SITE CM-2: Industrial Waste Line
CM-3: Sanitary Waste Line
Wastewater Characterization Survey: 16-22 November 1995
Cheyenne Mountain AFB, CO

	CM - 2		CM - 3		
	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE
GROUP A & B ANALYTES (mg/L)	18 Nov 95	21-Nov-95	17-Nov-95	18-Nov-95	21 Nov 95
Chemical Oxygen Demand	43	22	823	605	414
Oil and Grease	40	6.72	35.2	22.4	25.6
Total Petroleum Hydrocarbon	32	5.76	4.8	3.2	20.8
Group C Analytes (mg/L)					
Ammonia	<0.2	<0.2	42	14	38
Kjeldahl Nitrogen (total)	0.7	0.9	76	21	47
GROUP D ANALYTES (mg/L)					
Cyanide (Total)	<0.005	<0.005	<0.005	<0.005	<0.005
GROUP E ANALYTES (µg/L)					
Phenols	37	<10	24	61	<10
GROUP F ANALYTES (mg/L)					
Aluminum	<0.03	0.034	0.316	0.326	0.376
Antimony	<0.003	<0.003	<0.003	<0.003	<0.003
Arsenic	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	<0.050	<0.05	0.057	0.052	0.068
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	0.055	<0.001	0.003
Chromium	0.026	0.015	0.021	0.025	0.022
Cobalt	<0.050	<0.050	<0.050	<0.050	<0.050
Copper	<0.010	<0.010	0.072	0.053	0.07
Iron	0.175	0.129	0.853	0.861	0.798
Lead	<0.005	<0.005	0.005	<0.005	<0.005
Manganese	<0.030	<0.03	<0.030	<0.030	<0.030
Mercury	<0.0002	<0.0002	0.0005	0.0005	0.0007
Molybdenum	0.277	0.696	<0.030	<0.030	<0.030
Nickel	<0.030	<0.030	<0.030	<0.030	<0.030
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	<0.010	<0.010	<0.010	<0.010	<0.010
Thallium	<0.001	<0.001	<0.001	<0.0001	<0.001
Titanium	<0.050	<0.050	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050	<0.050	<0.050
Zinc	0.076	0.138	0.124	0.139	0.18
Group G (mg/L)					
Residue Total	161	312	908	470	889
Residue, Filterable (TDS)	148	296	650	278	785
Residue, Nonfilterable (TSS)	2	2	295	74	460
Surfactants-MBAs	<0.1	0.4	8.2	4.4	2.5
ON SITE ANALYSES					
pH (units)	5	5	6	5	5
Temperature (°F)	50	50	49	48	46
SAMPLE NUMBERS	CN951949	CN951967	CN951955	CN951973	CN951991
	CN951950	CN951968	CN951956	CN951974	CN951992
	GN951951	GN951969	GN951957	GN951975	GN951993

TABLE E-2 SITE CM-2: Industrial Waste Line

CM-3: Sanitary Waste Line

Wastewater Characterization Survey: 16-22 November 1995

Cheyenne Mountain AFB, CO

	CM - 2		CM - 3		
EPA METHOD 601/602	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE
VOLATILE COMPOUNDS (µg/L)	18 Nov 95	21-Nov-95	17-Nov-95	18-Nov-95	21 Nov 95
Benzene	<1	<1	<1	<1	<1
Benzyl Chloride	<1	<1	<1	<1	<1
Bromobenzene	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1
Bromoform	<1	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
Chlorodibromomethane	<1	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1	<1
Chloroform	<1	<1	1	<1	<1
2-Chlorethylvinyl Ether	<1	<1	<1	<1	<1
Chloromethane	<1	<1	<1	1.4	<1
Chlorodibromomethane	<1	<1	<1	<1	<1
Dibromomethane	1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	2	1.7	<1
Dichlorodifluoromethane	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1	<1	<1
Trans-1,2-Dichloroethene	<1	<1	<1	<1	<1
1,2-Dichloroethene	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1
Cis-1,3-Dichloropropene	<1	<1	<1	<1	<1
Trans-1,3-Dichloropropene	<1	<1	<1	<1	<1
Ethyl Benzene	<1	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1
Tetrachloroethylene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1
EPA METHOD NYAPC-44 (µg/L)					
Glycols (total)	<50	591.97	683.05	447.1	Not Collected
SAMPLE NUMBER	GN951952	GN951970	GN951958	GN951976	GN951994
	CN951954	GN951972	GN951960	CN951978	CN951996

TABLE E-3; SITE CM-4 STORM DRAIN, SITE CM-5 VEHICLE MAINTENANCE, SITE CM - 6 INDUSTRIAL/INFILTRATION RESERVOIR AND SITE CM-7 DOMESTIC WATER RESERVOIR

Wastewater Characterization Survey: 16-22 November 1995

Cheyenne Mountain AFB, CO

	STORM DRAIN CM - 4	VEHICLE MX CM - 5	INDUSTRIAL CM - 6	DOMESTIC CM - 7
	COLLECTION DATE		COLLECTION DATE	
GROUP A & B ANALYTES (mg/L)	16-Nov-96	21-Nov-95	20 Nov 95	20-Nov-95
Chemical Oxygen Demand	25	<10	<10	<10
Oil and Grease	320	2	9.6	0.9
Total Petroleum Hydrocarbon	128	1.2	9.6	0.9
Group C Analytes (mg/L)				
Ammonia	1.2	1.58	24.6	<0.2
Kjeldahl Nitrogen (total)	0.7	4.5	32.5	0.4
GROUP D ANALYTES (mg/L)				
Cyanide (Total)	<0.005	<0.005	<0.005	<0.005
GROUP E ANALYTES (µg/L)				
Phenols	10	<10	35	<10
GROUP F ANALYTES (mg/L)				
Aluminum	0.058	0.086	<0.030	0.108
Antimony	<0.003	<0.003	<0.003	<0.003
Arsenic	<0.005	<0.005	<0.005	<0.005
Barium	0.062	0.05	<0.050	0.071
Beryllium	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	<0.001	<0.001
Chromium	0.015	0.028	<0.010	<0.010
Cobalt	<0.050	<0.050	<0.050	<0.050
Copper	<0.010	0.018	<0.010	0.228
Iron	0.403	0.205	<0.030	0.266
Lead	<0.005	<0.005	0.002	<0.001
Manganese	<0.030	<0.030	<0.030	<0.030
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	0.305	<0.030	<0.030	<0.030
Nickel	<0.030	<0.030	<0.030	<0.030
Selenium	<0.005	<0.005	<0.0005	<0.0005
Silver	<0.010	<0.010	<0.010	<0.010
Thallium	<0.001	<0.0001	<0.001	<0.001
Titanium	<0.050	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050	<0.050
Zinc	0.083	<0.050	<0.050	<0.050
Group G (mg/L)				
Residue Total	192	237	192	250
Residue, Filterable (TDS)	182	232	191	241
Residue, Nonfilterable (TSS)	6	7	13	1
Surfactants-MBAs	<0.1	<0.1	<0.1	<0.1
ON SITE ANALYSES				
pH (units)	5	5	7	
Temperature (°C)	18	48°F	10	
SAMPLE NUMBERS	CN951997	CN952003	CN951897	GN952009

TABLE E-3; SITE CM-4 STORM DRAIN, SITE CM-5 VEHICLE MAINTENANCE, SITE CM - 6 INDUSTRIAL/INFILTRATION RESERVOR AND SITE CM-7 DOMESTIC WATER RESERVOIR

Wastewater Characterization Survey: 16-22 November 1995

Cheyenne Mountain AFB, CO

	STORM DRAIN CM - 4	VEHICLE MX CM - 5	INDUSTRIAL CM - 6	DOMESTIC CM - 7
EPA METHOD 601/602/624	COLLECTION DATE		COLLECTION DATE	
VOLATILE COMPOUNDS (µg/L)	16-Nov-96	21 Nov 95	20-Nov-95	20-Nov-95
Benzene	<1	<1	<0.5	<0.5
Benzyl Chloride	<1	<1	<0.5	<0.5
Bromobenzene	<1	<1	<0.5	<0.5
Bromodichloromethane	<1	1	<0.5	13.9
Bromoform	<1	<1	<0.5	<0.5
Bromomethane	<1	<1	<0.5	<0.5
Carbon tetrachloride	<1	<1	<0.5	<0.5
Chlorobenzene	<1	<1	<0.5	<0.5
Chlorodibromomethane	<1	<1	<0.5	<0.5
Chloroethane	<1	<1	<0.5	<0.5
Chloroform	<1	2.6	<0.5	49.2
2-Chlorethylvinyl Ether	<1	<1	<0.5	<0.5
Chloromethane	<1	<1	<0.5	<0.5
Chlorodibromomethane	<1	<1	<0.5	2.5
Dibromomethane	<1	<1	<0.5	<0.5
1,2-Dichlorobenzene	<1	<1	<0.5	<0.5
1,3-Dichlorobenzene	<1	<1	<0.5	<0.5
1,4-Dichlorobenzene	<1	<1	<0.5	<0.5
Dichlorodifluoromethane	<1	<1	<0.5	<0.5
1,1-Dichloroethane	<1	<1	<0.5	<0.5
1,2-Dichloroethane	<1	<1	<0.5	<0.5
1,1-Dichloroethene	<1	<1	<0.5	<0.5
cis-1,2-Dichloroethene*	NT	NT	8.3	<0.5
Trans-1,2-Dichloroethene	<1	<1	<0.5	<0.5
1,2-Dichloroethene	<1	<1	<0.5	<0.5
1,2-Dichloropropane	<1	<1	<0.5	<0.5
Cis-1,3-Dichloropropene	<1	<1	<0.5	<0.5
Trans-1,3-Dichloropropene	<1	<1	<0.5	<0.5
Ethyl Benzene	<1	<1	<0.5	<0.5
Methylene Chloride	<1	<1	<0.5	<0.5
1,1,1,2-Tetrachloroethane	<1	<1	<0.5	<0.5
1,1,2,2-Tetrachloroethane	<1	<1	<0.5	<0.5
Tetrachloroethylene	<1	<1	<0.5	<0.5
Toluene	<1	<1	<0.5	<0.5
1,1,1-Trichloroethane	<1	<1	2.9	<0.5
1,1,2-Trichloroethane	<1	<1	<0.5	<0.5
Trichloroethylene	<1	<1	*5.4	<0.5
Trichlorofluoromethane	<1	<1	<0.5	<0.5
1,2,3-Trichloropropane	<1	<1	<0.5	<0.5
Vinyl Chloride	<1	<1	<0.5	<0.5
o-Xylene*	NT	NT	<0.5	<0.5
m-Xylene*	NT	NT	<0.5	<0.5
Tetrahydrofuran*	NT	NT	<0.5	<0.5
*EPA METHOD 624			*ABOVE THE 5 µg/L MCL	
SAMPLE NUMBER	GN952000	GN952006	GP952018	GP952012
EPA METHOD502.2 (µg/L)				
Bromodichloromethane	NT	NT	<0.5	13.9
Bromoform	NT	NT	<0.5	<0.5
Chloroform	NT	NT	<0.5	49.2
Chlorodibromomethane	NT	NT	<0.5	2.5
Total Trihalomethane	NT	NT	<0.5	65.6
SAMPLE NUMBER			GP952020	GN952014

Cheyenne Mountain AS, CO

WASTEWATER CHARACTERIZATION SURVEY: 15 Nov - 22 Nov 1995

TABLE E-4 Pitcher Blank

	COLLECTION DATE		COLLECTION DATE
GROUP A & B ANALYTES (mg/L)	Tues, 21 Nov 95	GROUP F ANALYTES (mg/L)	Tues, 21 Nov 95
Chemical Oxygen Demand	<10	Aluminum	0.246
Oil and Grease	2.5	Antimony	<0.003
Total Petroleum Hydrocarbon	1.4	Arsenic	<0.005
		Barium	0.048
Group C Analytes (mg/L)		Beryllium	<0.001
Ammonia	<0.2	Cadmium	<0.001
Kjeldahl Nitrogen (total)	0.5	Chromium	0.025
		Cobalt	<0.050
GROUP D ANALYTES (mg/L)		Copper	0.038
Cyanide (Total)	<0.005	Iron	0.58
		Lead	<0.005
GROUP E ANALYTES (µg/L)		Manganese	0.055
Phenols	<10	Mercury	<0.0002
		Molybdenum	<0.030
EPA METHOD NYAPC-44		Nickel	<0.030
Glycols (total)	<50	Selenium	<0.005
		Silver	<0.010
Group G (mg/L)		Thallium	<0.001
Residue Total	25	Titanium	<0.050
Residue, Filterable (TDS)	28	Vanadium	<0.050
Residue, Nonfilterable (TSS)	6	Zinc	0.05
SAMPLE NUMBER	BK952021	SAMPLE NUMBERS	GN951920
	BK952025		

APPENDIX F

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:
15 Nov - 22 Nov 1995

TABLE F-1 SITE 1: Pond Effluent

	COLLECTION DATE		
GROUP A & B ANALYTES (mg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
Chemical Oxygen Demand	103	167	81
Oil and Grease	14.4	6.4	9.6
Total Petroleum Hydrocarbon	6.4	6.4	9.6
GROUP C ANALTYES (mg/L)			
Ammonia	22.4	26.4	24.6
Kjeldahl Nitrogen (total)	30.5	29.5	32.5
GROUP D ANALYTES (mg/L)			
Cyanide (Total)	<0.005	<0.005	0.008
GROUP E ANALYTES (µg/L)			
Phenols	37	26	<10
GROUP F ANALYTES (mg/L)			
Aluminum	0.231	0.246	0.195
Antimony	<0.003	0.003	<0.003
Arsenic	<0.005	<0.005	<0.005
Barium	0.057	0.058	0.043
Beryllium	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	<0.001
Chromium	0.053	0.038	<0.010
Cobalt	<0.050	<0.050	<0.050
Copper	0.056	0.058	0.042
Iron	0.591	0.727	0.392
Lead	<0.005	<0.005	0.002
Manganese	0.053	0.051	0.044
Mercury	<0.0002	<0.0002	<0.0002
Molybdenum	0.694	0.588	0.177
Nickel	0.044	0.036	<0.030
Selenium	<0.005	<0.010	<0.010
Silver	<0.010	<0.010	<0.010
Thallium	<0.001	<0.001	<0.001
Titanium	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050
Zinc	0.055	0.051	<0.050
GROUP G (mg/L)			
Residue Total	699	720	868
Residue, Filterable (TDS)	480	668	885
Residue, Nonfilterable (TSS)	68	48	110
Surfactants-MBAs	0.3	0.8	0.2
ON SITE ANALYSES			
pH (units)	10	6.8	8.5
Temperature (°C)	10	18	10
SAMPLE NUMBERS	CN951846	CN951866	CN951886
	CN951847	CN951867	CN951887
	GN951848	GN951868	GN951888
EPA METHOD NYAPC-44			
Glycols (total)	163.96	145.14	568.39

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:
15 Nov - 22 Nov 1995

TABLE F-1 SITE 1: Pond Effluent

	COLLECTION DATE		
VOLATILE COMPOUNDS (µg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
EPA Method 601 / 602			
Benzene	<1	<1	<1
Benzyl Chloride	<1	<1	<1
Bromobenzene	<1	<1	<1
Bromodichloromethane	<1	<1	<1
Bromoform	<1	<1	<1
Bromomethane	<1	<1	<1
Carbon tetrachloride	<1	<1	<1
Chlorobenzene	<1	<1	<1
Chlorodibromomethane	<1	<1	<1
Chloroethane	<1	<1	<1
Chloroform	<1	<1	<1
2-Chlorethylvinyl Ether	<1	<1	<1
Chloromethane	<1	<1	<1
Chlorodibromomethane	<1	<1	<1
Dibromomethane	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1
Dichlorodifluoromethane	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1
Trans-1,2-Dichloroethene	<1	<1	<1
1,2-Dichloroethene	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1
Cis-1,3-Dichloropropene	<1	<1	<1
Trans-1,3-Dichloropropene	<1	<1	<1
Ethyl Benzene	<1	<1	<1
Methylene Chloride	<1	<1	<1
1,1,1,2-Tetrachloroethane	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1
Tetrachloroethylene	<1	<1	<1
Toluene	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1
Trichloroethylene	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1
1,2,3-Trichloropropane	<1	<1	<1
Vinyl Chloride	<1	<1	<1
o-Xylene	<1	<1	<1
p,m-Xylene	<1	<1	<1
SAMPLE NUMBER	GN951849	GN951869	GN941889

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:
15 Nov - 22 Nov 1995

TABLE F-1 SITE 1: Pond Effluent

	COLLECTION DATE		
EPA METHOD 615 (ug/L)	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
2,4-D	BBS	<1.2	<1.2
2,4-DB	BBS	<0.91	<0.91
Dalapon	BBS	<5.8	<5.8
Dicamba	BBS	<0.27	<0.27
Dichloroprop	BBS	<0.65	<0.65
Dinoseb	BBS	<0.07	<0.07
MCPA	BBS	<249	<249
MCPP	BBS	<192	<192
Silvex	BBS	<0.17	<0.17
2,4,5-T	BBS	<0.20	<0.20
SAMPLE NUMBER	GN951850	GN951870	GN951890

*Broken Before Shipment Refrigerator Froze Sample & Broke Bottle

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

15 Nov - 22 Nov 1995

TABLE F-2, SITE F-2: Pond Influent

	COLLECTION DATE	
GROUP A & B ANALYTES (mg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95
Chemical Oxygen Demand	343	301
Oil and Grease	33.6	35.2
Total Petroleum Hydrocarbon	8	28.8
Group C Analytes (mg/L)		
Ammonia	18	35.2
Kjeldahl Nitrogen (total)	28	46
GROUP D ANALYTES (mg/L)		
Cyanide (Total)	<0.005	0.01
GROUP E ANALYTES (µg/L)		
Phenols	53	33
GROUP F ANALYTES (mg/L)		
Aluminum	0.096	0.091
Antimony	<0.003	<0.003
Arsenic	<0.005	<0.005
Barium	0.059	0.071
Beryllium	<0.001	<0.001
Cadmium	<0.001	<0.001
Chromium	0.019	<0.010
Cobalt	<0.050	<0.050
Copper	0.076	0.091
Iron	0.438	0.33
Lead	<0.005	<0.005
Manganese	<0.030	0.03
Mercury	<0.0002	<0.0002
Molybdenum	0.204	0.151
Nickel	<0.030	<0.030
Selenium	<0.005	<0.010
Silver	<0.010	<0.010
Thallium	<0.001	<0.001
Titanium	<0.050	<0.050
Vanadium	<0.050	<0.050
Zinc	0.055	0.082
Group G (mg/L)		
Residue Total	546	952
Residue, Filterable (TDS)	402	1015
Residue, Nonfilterable (TSS)	22	175
Surfactants-MBAs	1.6	0.8
ON SITE ANALYSES		
pH (units)	6.5	7
Temperature (°C)	24	10
SAMPLE NUMBERS	CN951852	CN951872
	CN951853	CN951873
	GN951854	GN951874

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

15 Nov - 22 Nov 1995

TABLE F-2, SITE F-2: Pond Influent

	COLLECTION DATE	
VOLATILE COMPOUNDS (µg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95
EPA METHOD 601/602		
Benzene	<1	<1
Benzyl Chloride	<1	<1
Bromobenzene	<1	<1
Bromodichloromethane	<1	<1
Bromoform	4.3	3.7
Bromomethane	<1	<1
Carbon tetrachloride	<1	<1
Chlorobenzene	<1	<1
Chlorodibromomethane	<1	<1
Chloroethane	<1	<1
Chloroform	<1	<1
2-Chlorethylvinyl Ether	<1	<1
Chloromethane	<1	<1
Chlorodibromomethane	1.5	1.5
Dibromomethane	<1	<1
1,2-Dichlorobenzene	<1	<1
1,3-Dichlorobenzene	<1	<1
1,4-Dichlorobenzene	2.2	4
Dichlorodifluoromethane	<1	<1
1,1-Dichloroethane	<1	<1
1,2-Dichloroethane	<1	<1
1,1-Dichloroethene	<1	<1
Trans-1,2-Dichloroethene	<1	<1
1,2-Dichloroethene	<1	<1
1,2-Dichloropropane	<1	<1
Cis-1,3-Dichloropropene	<1	<1
Trans-1,3-Dichloropropene	<1	<1
Ethyl Benzene	<1	<1
Methylene Chloride	<1	<1
1,1,1,2-Tetrachloroethane	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1
Tetrachloroethylene	<1	<1
Toluene	<1	<1
1,1,1-Trichloroethane	<1	<1
1,1,2-Trichloroethane	<1	<1
Trichloroethylene	<1	<1
Trichlorofluoromethane	<1	<1
1,2,3-Trichloropropane	<1	<1
Vinyl Chloride	<1	<1
o-Xylene	<1	<1
p,m-Xylene	<1	<1
SAMPLE NUMBER	GN951855	GN951875

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:
15 Nov - 22 Nov 1995

TABLE F-2, SITE F-2: Pond Influent

	COLLECTION DATE	
EPA METHOD 615 (µg/L)	Fri, 17 Nov 95	Sat, 18 Nov 95
2,4-D	<1.2	<1.2
2,4-DB	<0.91	<0.91
Dalapon	<5.8	<5.8
Dicamba	<0.27	<0.27
Dichloroprop	<0.65	<0.65
Dinoseb	<0.07	<0.07
MCPA	<249	<249
MCPP	<192	<192
Silvex	<0.17	<0.17
2,4,5-T	<0.20	<0.20
SAMPLE NUMBER	GN951856	GN951876

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

15 Nov - 22 Nov 1995

TABLE F-3 SITE 3: Bldg 300/400

	COLLECTION DATE		
	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
GROUP A & B ANALYTES (mg/L)	24 hr composite	24 hr composite	grab
Chemical Oxygen Demand	465	473	265
Oil and Grease	80	16	9.6
Total Petroleum Hydrocarbon	14.4	3.2	9.6
GROUP C ANALYTES (mg/L)			
Ammonia	26.8	11.2	17.2
Kjeldahl Nitrogen (total)	50	34	49
GROUP E ANALYTES (µg/L)			
Phenols	35	33	28
GROUP F ANALYTES (mg/L)			
Aluminum	0.13	0.121	0.36
Antimony	<0.003	<0.003	<0.003
Arsenic	<0.005	<0.005	<0.005
Barium	0.09	<0.001	0.05
Beryllium	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	0.001
Chromium	0.024	0.032	<0.020
Cobalt	<0.050	<0.050	<0.050
Copper	0.103	0.061	0.041
Iron	0.569	0.325	0.588
Lead	<0.005	0.007	<0.020
Manganese	<0.030	<0.030	<0.030
Mercury	<0.0002	<0.0002	<0.0002
Molybdenum	<0.030	<0.030	<0.030
Nickel	<0.030	<0.030	<0.030
Selenium	0.005	<0.005	<0.005
Silver	<0.010	<0.010	<0.010
Thallium	<0.001	<0.0001	<0.001
Titanium	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050
Zinc	0.074	<0.050	0.121
GROUP G (mg/L)			
Residue Total	844	654	819
Residue, Filterable (TDS)	460	464	704
Residue, Nonfilterable (TSS)	48	44	164
Surfactants-MBAs	3.6	2.4	1.1
ON SITE ANALYSES			
pH (units)	6.5	6.5	7
Temperature (°C)	22	20	10
SAMPLE NUMBERS	CN951857	CN951877	CN951897
	CN951858	CN951878	CN951898
	GN951859	GN951879	GN951899

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

15 Nov - 22 Nov 1995

TABLE F-4 SITE F-4: Bldg 500/600

	COLLECTION DATE		
	Fri, 17 Nov 95	Sat, 18 Nov 95	Tues, 21 Nov 95
GROUP A & B ANALYTES (mg/L)	24 hr composite	24 hr composite	24 hr composite
Chemical Oxygen Demand	460	335	149
Oil and Grease	2176	20.8	16
Total Petroleum Hydrocarbon	768	3.2	8
GROUP C ANALYTES (mg/L)			
Ammonia	30.4	22.4	27.6
Kjeldahl Nitrogen (total)	45	33	32
GROUP E ANALYTES (ug/L)			
Phenols	45	41	73
GROUP F ANALYTES (mg/L)			
Aluminum	0.243	0.085	0.042
Antimony	<0.003	<0.003	<0.003
Arsenic	<0.005	<0.005	<0.005
Barium	0.075	0.073	0.074
Beryllium	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	<0.001
Chromium	0.031	0.021	0.067
Cobalt	<0.050	<0.050	<0.050
Copper	0.073	0.079	0.052
Iron	0.52	0.378	0.39
Lead	<0.005	<0.005	<0.020
Manganese	<0.030	0.046	<0.030
Mercury	<0.0002	<0.0002	<0.0002
Molybdenum	<0.030	<0.030	<0.030
Nickel	<0.030	<0.030	0.034
Selenium	<0.005	<0.005	<0.005
Silver	<0.010	<0.010	0.011
Thallium	<0.0001	<0.0001	<0.001
Titanium	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050
Zinc	0.09	0.097	<0.030
GROUP G (mg/L)			
Residue Total	802	865	966
Residue, Filterable (TDS)	608	672	824
Residue, Nonfilterable (TSS)	60	80	52
Surfactants-MBAs	2.8	1.6	0.2
ON SITE ANALYSES			
pH (units)	6	6.8	6.8
Temperature (°C)	22	19	12
SAMPLE NUMBERS	CN951860	CN951880	CN951900
	CN951861	CN951881	CN951901
	GN951862	GN951882	GN951902

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

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TABLE F-5 SITE F-5 : North Area

	COLLECTION DATE		
	Fri. 17 Nov 95	Sat. 18 Nov 95	Tues. 21 Nov 95
GROUP A & B ANALYTES (mg/L)	grab; low flow	24 hr composite	24 hr composite
Chemical Oxygen Demand	85	39	99
Oil and Grease	11.2	8	2.8
Total Petroleum Hydrocarbon	8	8	1.6
GROUP C ANALYTES (mg/L)			
Ammonia	34.4	16.4	56
Kjeldahl Nitrogen (total)	36.5	19.5	49
GROUP E ANALYTES (ug/L)			
Phenols	14	50	25
GROUP F ANALYTES (mg/L)			
Aluminum	0.048	0.034	0.072
Antimony	<0.003	<0.003	0.029
Arsenic	<0.005	<0.005	<0.005
Barium	0.06	0.045	<0.050
Beryllium	<0.001	<0.001	<0.001
Cadmium	<0.001	<0.001	<0.001
Chromium	0.036	0.028	<0.025
Cobalt	<0.050	<0.050	<0.050
Copper	0.035	0.019	0.039
Iron	0.273	0.176	0.273
Lead	<0.005	0.005	<0.020
Manganese	<0.030	<0.030	<0.030
Mercury	<0.0002	<0.0002	<0.0002
Molybdenum	<0.030	<0.030	<0.030
Nickel	<0.030	<0.030	<0.030
Selenium	<0.005	<0.005	<0.005
Silver	<0.010	<0.010	<0.010
Thallium	<0.0001	<0.0001	<0.001
Titanium	<0.050	<0.050	<0.050
Vanadium	<0.050	<0.050	<0.050
Zinc	<0.050	<0.050	<0.050
GROUP G (mg/L)			
Residue Total	389	356	448
Residue, Filterable (TDS)	346	319	436
Residue, Nonfilterable (TSS)	10	12	8
Surfactants-MBAs	0.2	<0.1	<0.1
ON SITE ANALYSES			
pH (units)	7	7	7
Temperature (°C)	14	20	10
SAMPLE NUMBERS	CN951863	CN951883	CN951903
	GN951865	GN951885	GN951905
	CN951864	CN951884	CN951904

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

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TABLE F-6 SITE F-6: Fire Dept, SITE F-7: Gas Fill Stand and Site F-8: Vehicle Maintenance

	Fire Dept	Gas Fill Stand		Vehicle Maintenance
	COLLECTION DATE			COLLECTION DATE
VOLATILE COMPOUNDS (µg/L) EPA METHOD 624			GROUP F ANALYTES (mg/L)	
Benzene		<5	Aluminum	0.246
Benzyl Chloride		<5	Antimony	<0.003
Bromobenzene		<5	Arsenic	<0.005
Bromodichloromethane		<5	Barium	0.048
Bromoform		<5	Beryllium	<0.001
Bromomethane		<5	Cadmium	<0.001
Carbon tetrachloride		<5	Chromium	0.025
Chlorobenzene		<5	Cobalt	<0.050
Chlorodibromomethane		<5	Copper	0.038
Chloroethane		<5	Iron	0.58
Chloroform		<5	Lead	<0.005
2-Chlorethylvinyl Ether		SEE COMMENT*	Manganese	0.055
Chloromethane		<5	Mercury	<0.0002
Chlorodibromomethane		<5	Molybdenum	<0.030
Dibromomethane		<5	Nickel	<0.030
1,2-Dichlorobenzene		<5	Selenium	<0.005
1,3-Dichlorobenzene		<5	Silver	<0.010
1,4-Dichlorobenzene		<5	Thallium	<0.001
Dichlorodifluoromethane		<5	Titanium	<0.050
1,1-Dichloroethane		<5	Vanadium	<0.050
1,2-Dichloroethane		<5	Zinc	0.05
1,1-Dichloroethene		<5		
Trans-1,2-Dichloroethene		<5		
1,2-Dichloroethene		<5		
1,2-Dichloropropane		<5		
Cis-1,3-Dichloropropene		<5		
Trans-1,3-Dichloropropene		<5		
Ethyl Benzene		<5		
Methylene Chloride		<5		
1,1,1,2-Tetrachloroethane		<5		
1,1,2,2-Tetrachloroethane		<5		
Tetrachloroethylene		<5		
Toluene		<5		
1,1,1-Trichloroethane		<5		
1,1,2-Trichloroethane		<5		
Trichloroethylene		<5		
Trichlorofluoromethane		<5		
1,2,3-Trichloropropane		<5		
Vinyl Chloride		<5		
o-Xylene		<5		
p,m-Xylene		<5		
SAMPLE NUMBER		GN951918		
*Recovery of 2-Chloroethyvinyl Ether was 0.0µg/L in the Matrix Spike.				

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

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TABLE F-6 SITE F-6: Fire Dept, SITE F-7: Gas Fill Stand and Site F-8: Vehicle Maintenance

	FIRE DEPT	GAS FILL STAND		VEHICLE MAINTENANCE
	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE	COLLECTION DATE
GROUP A & B ANALYTES (mg/L)	Tues, 21 Nov 95	Tues, 21 Nov 95	GROUP A & B ANALYTES (mg/L)	Tues, 21 Nov 95
Chemical Oxygen Demand	75		Oil and Grease	2
Oil and Grease	12	3.2	Total Petroleum Hydrocarbon	1.4
Total Petroleum Hydrocarbon	8.4	1.2		
GROUP E ANALYTES (µg/L)			GROUP E ANALYTES (µg/L)	
Phenols	35	<10	Phenols	<10
Group G (mg/L)			Group G (mg/L)	
Surfactants-MBAs	0.9	0.1	Surfactants-MBAs	0.1
EPA METHOD NYAPC-44				
Glycols (total)	437.61	498.01		
ON SITE ANALYSES				
pH (units)	6	7		
Temperature (°C)	17	10		
SAMPLE NUMBERS	GN951912	CN951916		
	GN951915	CN951919		

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

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TABLE F-7 SITE F-9: Chow Hall Grease Trap Influent and Site F-10: Chow Hall Grease Trap Effluent

	INFLUENT	EFFLUENT
	COLLECTION DATE	
GROUP A & B ANALYTES (mg/L)	Tues, 21 Nov 95	Tues, 21 Nov 95
Chemical Oxygen Demand		
Oil and Grease	464	1440
Total Petroleum Hydrocarbon	88	480
GROUP C ANALYTES (mg/L)		
Ammonia	<0.2	<0.2
Kjeldahl Nitrogen (total)	12	19.5
GROUP E ANALYTES (µg/L)		
Phenols	<10	15
GROUP G (mg/L)		
Residue Total	2222	1510
Residue, Filterable (TDS)	970	1180
Residue, Nonfilterable (TSS)	1260	2710
Surfactants-MBAs	1.8	3.7
ON SITE ANALYSES		
pH (units)	3	3
Temperature (°C)	15	15
EPA METHOD 615 (µg/L)		
2,4-D	<1.2	<1.2
2,4-DB	<0.91	<0.91
Dalapon	<5.8	<5.8
Dicamba	<0.27	<0.27
Dichloroprop	<0.65	<0.65
Dinoseb	<0.07	<0.07
MCPA	<249	<249
MCPP	<192	<192
Silvex	<0.17	<0.17
2,4,5-T	<0.20	<0.20
SAMPLE NUMBERS	GN951924	CN951927
	GN951925	CN951928

	INFLUENT	EFFLUENT
	COLLECTION DATE	
VOLATILE COMPOUNDS (µg/L) EPA METHOD 624	Tues, 21 Nov 95	Tues, 21 Nov 95
Acetone	11	<5
Benzene	<5	<5
Benzyl Chloride	<5	<5
Bromobenzene	<5	<5
Bromodichloromethane	<5	<5
Bromoform	9.6	7.9
Bromomethane	<5	<5
Carbon tetrachloride	<5	<5
Chlorobenzene	<5	<5
Chlorodibromomethane	<5	<5
Chloroethane	<5	<5
Chloroform	<5	<5
2-Chlorethylvinyl Ether	SEE COMMENTS	SEE COMMENTS
Chloromethane	<5	<5
Chlorodibromomethane	<5	<5
Dibromomethane	<5	<5
1,2-Dichlorobenzene	<5	<5
1,3-Dichlorobenzene	<5	<5
1,4-Dichlorobenzene	<5	<5
Dichlorodifluoromethane	<5	<5
1,1-Dichloroethane	<5	<5
1,2-Dichloroethane	<5	<5
1,1-Dichloroethene	<5	<5
Trans-1,2-Dichloroethene	<5	<5
1,2-Dichloroethene	<5	<5
1,2-Dichloropropane	<5	<5
Cis-1,3-Dichloropropene	<5	<5
Trans-1,3-Dichloropropene	<5	<5
Ethanol	12	<5
Ethyl Benzene	<5	<5
Methylene Chloride	<5	<5
Limonene	48	31
1,1,1,2-Tetrachloroethane	<5	<5
1,1,2,2-Tetrachloroethane	<5	<5
Tetrachloroethylene	<5	<5
Toluene	<5	<5
1,1,1-Trichloroethane	<5	<5
1,1,2-Trichloroethane	<5	<5
Trichloroethylene	<5	<5
Trichlorofluoromethane	<5	<5
1,2,3-Trichloropropane	<5	<5
m and p Xylene	<5	5.1
Propanoic Acid Propylester	<5	6
Butanoic Acid Propyl Ester	<5	5
Pentanoic Acid Ethyl Ester	<5	9
SAMPLE NUMBER	GN951926	CN951929

*Recovery of 2-Chloroethyvinyl Ether was 0.0 ug/L in the Matrix Spike.

Falcon AFB, CO
WASTEWATER CHARACTERIZATION SURVEY:
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TABLE F-8 Potable Water

	COLLECTION DATE		COLLECTION DATE
GROUP A & B ANALYTES (mg/L)	Fri, 17 Nov 95		Tues, 21 Nov 95
Chemical Oxygen Demand	73	Benzene	<0.5
Oil and Grease	4.8	Benzyl Chloride	<0.5
Total Petroleum Hydrocarbon	4.8	Bromobenzene	<0.5
		Bromodichloromethane	1.3
GROUP C ANALYTES (mg/L)		Bromoform	9.4
Ammonia	<0.2	Bromomethane	<0.5
Kjeldahl Nitrogen (total)	0.2	Carbon tetrachloride	<0.5
		Chlorobenzene	<0.5
GROUP D ANALYTES (mg/L)		Chlorodibromomethane	5.6
Cyanide (Total)	<0.005	Chloroethane	<0.5
		Chloroform	<0.5
GROUP E ANALYTES (µg/L)		2-Chlorethylvinyl Ether	<0.5
Phenols	18	Chloromethane	<0.5
		Chlorodibromomethane	<0.5
GROUP F ANALYTES (mg/L)		Dibromomethane	<0.5
Aluminum	<0.030	1,2-Dichlorobenzene	<0.5
Antimony	0.005	1,3-Dichlorobenzene	<0.5
Arsenic	<0.005	1,4-Dichlorobenzene	<0.5
Barium	0.114	Dichlorodifluoromethane	<0.5
Beryllium	<0.001	1,1-Dichloroethane	<0.5
Cadmium	<0.001	1,2-Dichloroethane	<0.5
Total Chromium	1.63	1,1-Dichloroethene	<0.5
Cobalt	<0.05	Trans-1,2-Dichloroethene	<0.5
Copper	0.07	1,2-Dichloroethene	<0.5
Iron	2.88	1,2-Dichloropropane	<0.5
Lead	<0.001	Cis-1,3-Dichloropropene	<0.5
Manganese	0.097	Trans-1,3-Dichloropropene	<0.5
Mercury	<0.0002	Ethyl Benzene	2.2
Molybdenum	0.109	Methylene Chloride	<0.5
Nickel	0.853	1,1,1,2-Tetrachloroethane	<0.5
Selenium	<0.005	1,1,2,2-Tetrachloroethane	<0.5
Silver	<0.010	Tetrachloroethylene	<0.5
Thallium	<0.001	Toluene	<0.5
Titanium	<0.050	1,1,1-Trichloroethane	<0.5
Vanadium	<0.050	1,1,2-Trichloroethane	<0.5
Zinc	0.143	Trichloroethylene	<0.5
		Trichlorofluoromethane	<0.5
GROUP G (mg/L)		1,2,3-Trichloropropane	<0.5
Langelier Index	-1.02	Vinyl Chloride	<0.5
Residue Total	299	o-Xylene	3
Residue , Filterable (TDS)	253	m-Xylene	8
Residue, Nonfilterable (TSS)	2	Tetrahydrofuran	
Surfactants-MBAs	<0.1		
ON SITE ANALYSES		**EPA METHOD 502.2 (ug/L)**	
pH (units)	7.2	Bromodichloromethane	1.7
Temperature (°C)	15	Bromoform	13
EPA METHOD 615 (µg/L)		Chloroform	<0.5
2,4-D	<1.2	Chlorodibromomethane	7.2
2,4-DB	<0.91	1,2,4-Trimethylbenzene	2.2
Dalapon	<5.8	Total Trihalomethane	21.9
Dicamba	<0.27	SAMPLE NUMBER	GP951909
Dichloroprop	<0.65		GP951911
Dinoseb	<0.07		GP951906
MCPA	<249		GP951907
MCPP	<192		GP951908
Silvex	<0.17		GN951910
2,4,5-T	<0.20		

Falcon AFB, CO

WASTEWATER CHARACTERIZATION SURVEY:

15 Nov - 22 Nov 1995

TABLE F-9 Pitcher Blank

GROUP A & B ANALYTES (mg/L)	Sat, 18 Nov 95		Tues, 21 Nov 95
Chemical Oxygen Demand	<10	Benzene	<0.5
Oil and Grease	1.7	Benzyl Chloride	<0.5
Total Petroleum Hydrocarbon	0.8	Bromobenzene	<0.5
		Bromodichloromethane	<0.5
GROUP C ANALYTES (mg/L)		Bromoform	<0.5
Ammonia	<0.2	Bromomethane	<0.5
Kjeldahl Nitrogen (total)	0.3	Carbon tetrachloride	<0.5
		Chlorobenzene	<0.5
GROUP D ANALYTES (mg/L)		Chlorodibromomethane	<0.5
Cyanide (Total)	<0.005	Chloroethane	<0.5
		Chloroform	<0.5
GROUP E ANALYTES (µg/L)		2-Chlorethylvinyl Ether	*SEE COMMENT
Phenols	<10	Chloromethane	<0.5
		Chlorodibromomethane	<0.5
GROUP F ANALYTES (mg/L)		Dibromomethane	<0.5
Aluminum	<0.030	1,2-Dichlorobenzene	<0.5
Antimony	<0.005	1,3-Dichlorobenzene	<0.5
Arsenic	<0.005	1,4-Dichlorobenzene	<0.5
Barium	<0.05	Dichlorodifluoromethane	<0.5
Beryllium	<0.001	1,1-Dichloroethane	<0.5
Cadmium	<0.001	1,2-Dichloroethane	<0.5
Total Chromium	0.021	1,1-Dichloroethene	<0.5
Cobalt	<0.05	Trans-1,2-Dichloroethene	<0.5
Copper	<0.020	1,2-Dichloroethene	<0.5
Iron	0.093	1,2-Dichloropropane	<0.5
Lead	<0.005	Cis-1,3-Dichloropropene	<0.5
Manganese	<0.030	Trans-1,3-Dichloropropene	<0.5
Mercury	<0.0002	Ethyl Benzene	<0.5
Molybdenum	<0.030	Methylene Chloride	<0.5
Nickel	<0.020	1,1,1,2-Tetrachloroethane	<0.5
Selenium	<0.005	1,1,2,2-Tetrachloroethane	<0.5
Silver	<0.010	Tetrachloroethylene	<0.5
Thallium	<0.001	Toluene	8.1
Titanium	<0.050	1,1,1-Trichloroethane	<0.5
Vanadium	<0.050	1,1,2-Trichloroethane	<0.5
Zinc	<0.050	Trichloroethylene	<0.5
		Trichlorofluoromethane	<0.5
GROUP G (mg/L)		1,2,3-Trichloropropane	<0.5
Residue Total	39	Vinyl Chloride	<0.5
Residue , Filterable (TDS)	19	o-Xylene	<0.5
Residue, Nonfilterable (TSS)	<1	m-Xylene	<0.5
Surfactants-MBAs	<0.1	Tetrahydrofuran	30
EPA METHOD 615 (µg/L)		SAMPLE NUMBER	BK1932
2,4-D	<1.2		
2,4-DB	<0.91	**EPA METHOD 502.2 (ug/L)**	
Dalapon	<5.8	Bromodichloromethane	1.46
Dicamba	<0.27	Bromoform	1.46
Dichloroprop	<0.65	Chloroform	<0.5
Dinoseb	<0.07	Chlorodibromomethane	<0.5
MCPA	<249	1,2,4-Trimethylbenzene	N/A
MCPP	<192	Total Trihalomethane	<0.5
Silvex	<0.17		
2,4,5-T	<0.20	**EPA METHOD NYAPC-44 ug/L**	
		Glycols (total)	196
SAMPLE NUMBERS	BK951913		
	BK951930	SAMPLE NUMBER	BK951932
	BK951931		BK951933